HOLMES'
BOTANICAL
NOTE BOOK

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Miss Appleton
with O. W. Holmes
kind regards
April 1881

HOLMES'

BOTANICAL NOTE BOOK

OR

PRACTICAL GUIDE

TO A

KNOWLEDGE OF BOTANY.

BY

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PREFACE.

This Note-book is intended as an aid to students in acquiring a practical knowledge of botany. The experience of the author has led him to believe that too often the names of plants merely are learned, while a corresponding knowledge of the structure of the plants, and of the reasons why they are placed in certain natural orders is not obtained. This is in a great measure owing to the numerous exceptions to given rules with which the student meets, and which, being to him an unknown quantity, lead him to take the easier and less puzzling method of learning the names from illustrations or from friends who know the plants. To render it a comparatively easy task to find out the order of any plant belonging to the more important natural orders, and of all plants indigenous to Britain, and at the same time to lead the student to familiarise himself by practical study with the various terms used in Botany both in the English and Latin languages, has been the object of the writer. To this end, two charts of the natural orders are given, in which the diagnostic characters are reduced to a minimum, those which are most easily observed having been chosen, as far as possible, in preference to the more minute, while all the exceptions have been indicated in an appendix. It is hoped that in this way, the student being familiarised with all the exceptions likely to be met with in this country, some of the difficulties attending a practical study of Botany will be removed. The 60 blank forms for practice in describing plants are intended to be used in botanical classes, thus allowing two for each of the summer course of 30 lectures usually given in medical schools. If this number be found insufficient, books, each containing 100 blank forms, can be obtained separately. It has not been thought necessary to include every known botanical term in the glossary, but only those which are most frequently met with in floras, in works on systematic Botany, and text-books, but blank pages are left for the insertion of any additional ones that it may be desired to remember. The pronunciation of botanical terms is acknowledged to be by no means uniform, and, to aid the student in this difficulty, the accentuation of both the English terms and the Latin words from which they are derived has been given. The latter have been, wherever possible, put in the nominative case and singular number.

A list of the plants most easily obtained during each month in the year, and which will best illustrate the various types and peculiarities of each natural order, is appended, so that the student may not neglect to observe and examine those plants which flower in the winter, autumn and spring, but cannot be obtained during the usual botanical course from May to July. In this list well-known names are in many cases given in preference to those that are scientific, in order that the plants may be more easily obtained from gardeners, &c.

Chart I. includes those natural orders of flowering plants, which are the more important in a botanical and medical point of view, and of which a knowledge is required in various medical and pharmaceutical schools, and in the second Bachelor of Science Examination at the London University.

Chart II. gives the diagnostic characters of all the other orders which contain plants indigenous to Britain.

The author will be glad to receive any suggestions, that would, if carried out, render this work more generally useful.

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CONTENTS.

Page.

Diagrams showing the parts of Flowering Plants 2

Explanation of Diagrams 5

Directions for examining Plants 8

On the Microscopical Examination of Plants 10

Directions for describing Plants in the Schedules 14

Glossary 15

Schedules 35–155

Index to Schedules 156

Chart No. I. 158–159

Directions for using the Charts 160

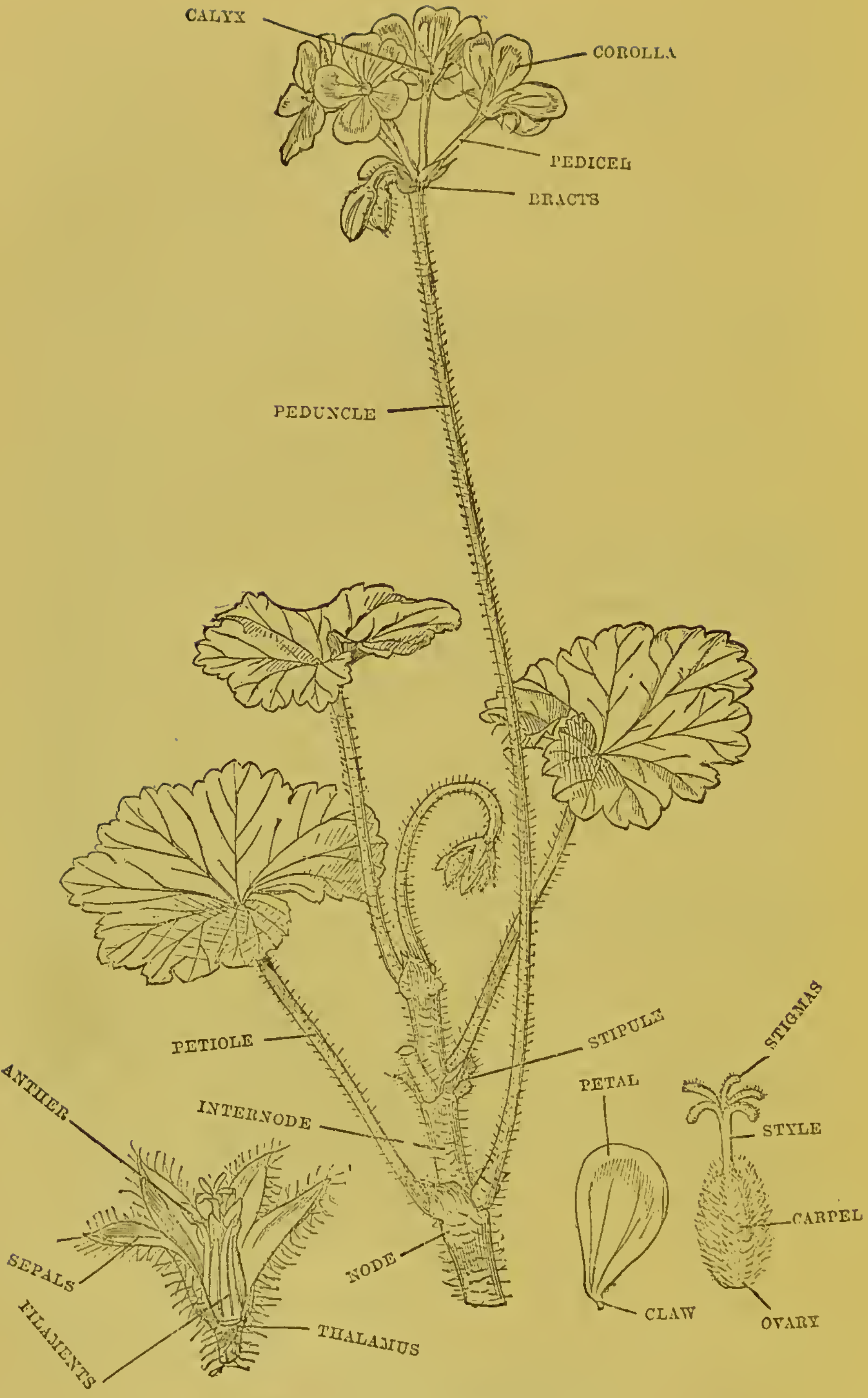
Appendix to Chart I. 163

Appendix to Chart II. 172

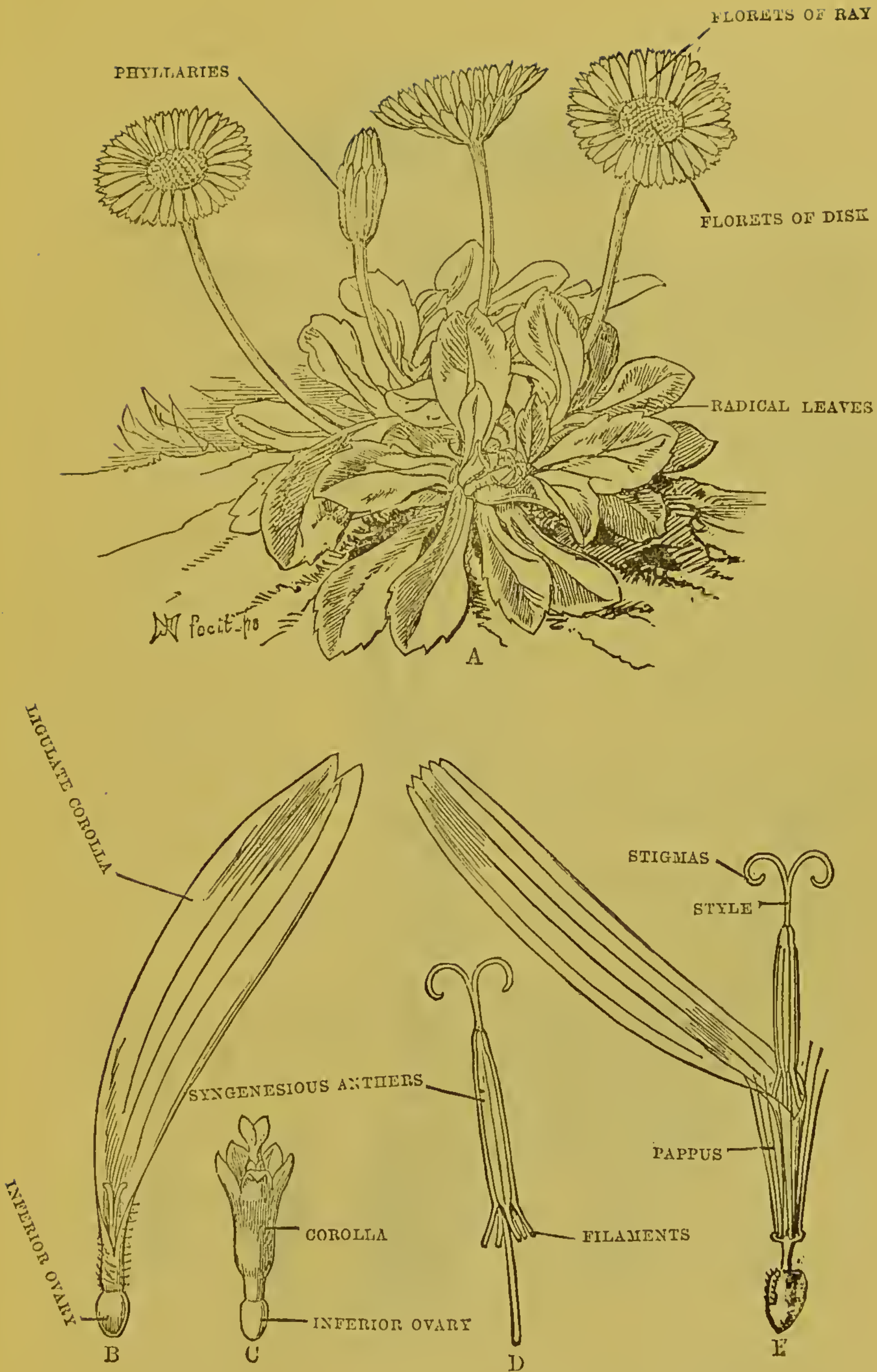
Chart No. II. 174–175

Floral Calendar 179

List for use in Medical Schools 186

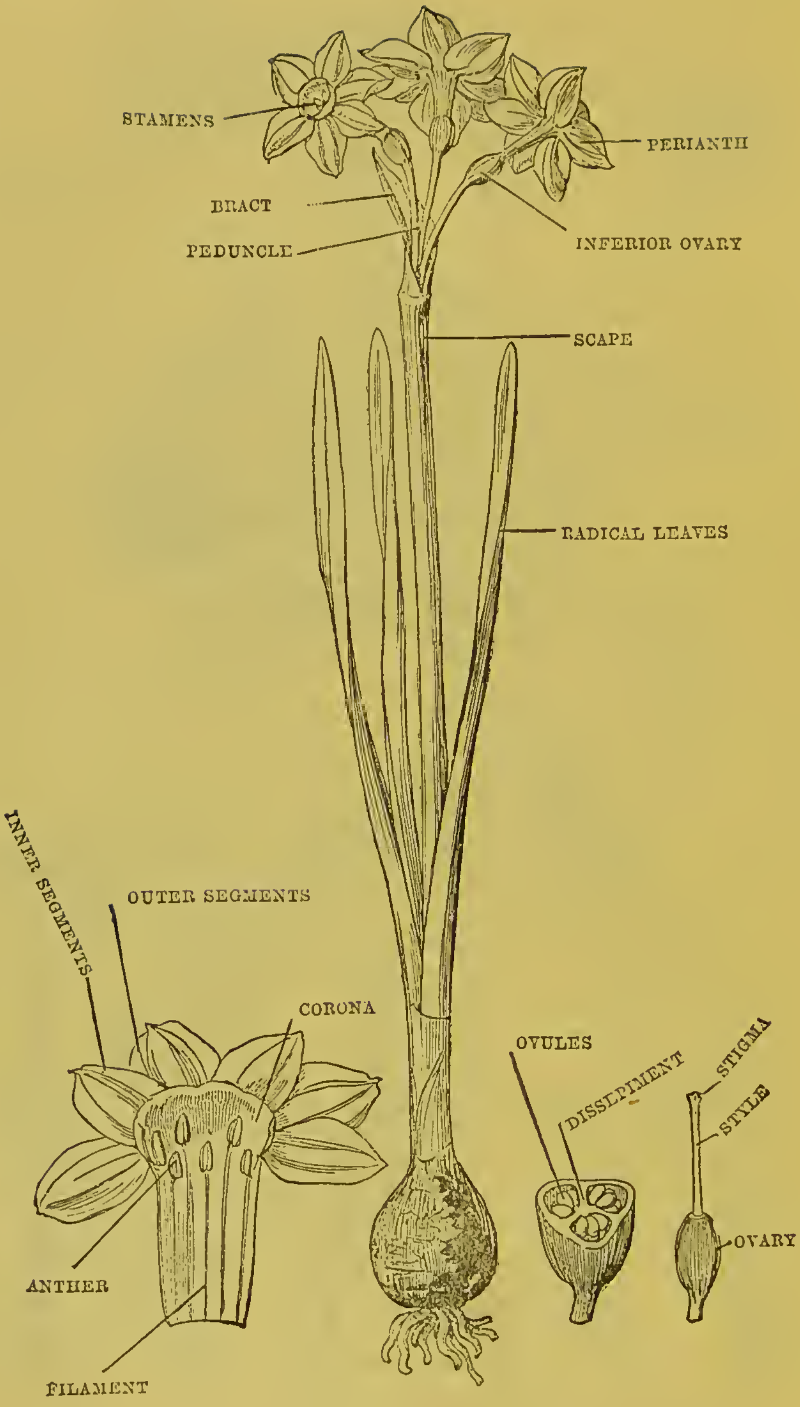


SCARLET GERANIUM.



DAISY, A B C.

DANDELION, D E.


STAMENS
PERIANTH
BRACT
PEDUNCLE
INFERIOR OVARY
SCAPE
RADICAL LEAVES
INNER SEGMENTS
OUTER SEGMENTS
CORONA
OVULES
DISSEPIMENT
STIGMA
STYLE
OVARY
ANTHER
FILAMENT

NARCISSUS.

EXPLANATION OF DIAGRAMS.

STEM.—This is the central portion of the plant to which the leaves are attached. When prolonged under ground, it is known from roots by the presence of scales or leaf-buds on it, as in the Iris and Couch-grass.

NODE.—This is the slightly swollen portion of the stem to which the leaves and stipules are attached.

INTERNODE.—The portion of stem between each node is so called.

LEAVES.—These consist of a stalk or *petiole*, and a *lamina* or blade; when the stalk is not developed, the leaves are said to be *sessile*. Those which proceed from the root are called *radical* leaves.

STIPULES.—These are always situated on the stem at the base of the leaf; when attached to the leaf-stalk they are called *adnate*, as in the Rose.

INFLORESCENCE.—This is the portion of the plant bearing flowers. If much branched, the main stem is called the *rachis*, and the branches *peduncles*, and the secondary branches *pedicels*. In the Geranium, the main stalk of the inflorescence is called the *peduncle*, and the secondary stalks are called the *pedicels*.

SCAPE.—If the inflorescence proceeds directly from the root, it is so called.

BRACTS.—These are modified leaves found at the base of each flower. They should not be confounded with stipules, which occur only at the base of leaves.

INVOLUCRE.—This is a ring of bracts surrounding a number of flowers, as in the Daisy. In the Daisy and other composite flowers, these bracts are called *phyllaries* to distinguish them from the *paleæ* or bracts which are sometimes present between each floret, as in the chamomile.

CALYX.– This is the outer row of leaves in the flower, each of these leaves being called a *sepal.*

PERIANTH.—Sometimes the sepals are coloured, as in the Narcissus, and then the calyx and corolla are collectively called the *perianth.* When this is the case, the calyx may be known by consisting of the outer alternate row of segments, and by these overlapping the petals at the edge. When only one row of coloured leaves is present, it is considered to be the calyx, and the corolla is supposed to be absent, as in the Anemone. When the calyx is developed in the form of hairs, as in the Dandelion, it is called the *pappus.*

COROLLA.—This is the inner row of leaves in the flower, consisting usually of delicate coloured pieces called *petals.* When the petals are distinct from each other, the lower tapering portion is called the *claw,* and the spreading portion the *limb;* when joined together, the united portion is called the *tube* of the corolla. If there are several rows of coloured leaves to the flower, and the outer ones do not form a ring, the latter are called bracts, as in the Cactus. Projections in the interior of the corolla tube near its apex are called *scales,* and are said to be in the *throat* of the corolla, as in Borage and Silene inflata.

STAMENS.—This is the row of thread-like bodies between the petals and the carpels, each one consisting usually of a thread-like portion called a *filament,* and a small bag at its apex called an *anther,* containing a powder called *pollen.* In some flowers, as in the Primrose, the filaments are absent, and the anthers are then said to be *sessile.* When the anthers are united, they are said to be *syngenesious,* as in the Dandelion.

PISTIL.—This contains the ovules or seeds, and occupies the centre of the flower. It consists of one or more pieces called *carpels* ; each carpel consisting of a swollen portion containing the seeds and called the *ovary,* surmounted by a thread-like portion called the *style,* which terminates in a viscid apex called the *stigma*. When the style is absent, as in the Tulip and Poppy, the stigma is said to be *sessile*. When the calyx tube adheres to the ovary, as in the Narcissus, the ovary is said to be *inferior*. In some plants, the carpels remain always distinct as in the Larkspur, and in others, become united as in the Geranium and Narcissus. When united their sides often form partitions called *dissepiments*.

THALAMUS.—This name is applied to the top of the flower-stalk. When the thalamus supports a number of flowers, as in the Daisy and Dandelion, it is called a *receptacle*. In such compound flowers, the outer strap-shaped or ligulate flowers are called the *florets of the ray*, and the central tubular ones the *florets of the disk*.

CORONA.—This is a cup-shaped or tubular part of the flower found sometimes inside the corolla, and appears to be formed from the dilated filaments of the anthers, as in the Eucharis grandiflora and Narcissus.

DIRECTIONS FOR EXAMINING PLANTS.

ROOT.—To distinguish between a true root and an underground stem, the presence of scales and leaf-buds should be looked for; the direction in which it grows will also be some guide, as stems usually grow horizontally when underground.

LEAF.—In examining a leaf, the structure is generally seen with ease by holding it up to the light, but if the leaf be succulent, its venation may be discovered by pressing the juice out of it, or by cutting a thin slice out of the leaf; thus, the Cactus stem treated in this way will show a network in its interior, and the Haworthia will reveal the veins running parallel to each other.

FLOWER.—In pulling a flower to pieces, if it have separate petals and be sufficiently large to be held between the fingers, one side of it should be taken firmly between the finger and thumb of the left hand, and the other side pulled with the right hand, so as to get proper resistance to the leverage exerted in pulling a portion off. If the flower be too small to be treated in this way, it should be examined by a lens* of about one inch focal distance, and the number of parts in the calyx and corolla noted first. It may then be pressed open with the point of a penknife, or with a stout needle stuck into a penholder, and the number of the stamens observed.

OVARY.—The structure of the ovary will be best discovered by taking one from a flower of which the blossom is over, and which will consequently be larger and better developed. A thin transverse section placed in a drop of water between two glass slides or held up to the light, will then reveal its structure; if very small, it should be looked at with a lens. In some plants the ovary looks like a flower-stalk, as in the Orchis and Epilobium ; if therefore, there does not appear to be any ovary inside the flower, the stalk below the flower should be cut open to see if it contains the seeds. In a large flower in which the parts are united, the flower should be slit open on *one side only* from below upwards, and not cut into two halves. In counting the number of parts in a flower, the number of divisions of the calyx and corolla, and the number of stamens, if fewer than 10, should be compared in more than one blossom, for some flowers, such as Saxifraga crassifolia and Jasminum nudiflorum, will not infrequently have six parts instead of five in some of the blossoms.

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* The small cheap lens (about 1s. 6d. each) known as a linen prover, answers well.

INFLORESCENCE.—In examining an inflorescence, if the flowers and buds appear to be opening neither centripetally nor centrifugally, but to be mixed up irregularly, the *smallest possible branch* of it should be taken off and examined, when it will be found to consist usually of three flowers, the central one of which is opening first, the inflorescence being therefore centrifugal ; sometimes, however, it consists of only two flowers, owing to the second lateral bud not being developed ; but upon taking another small branch with three flowers, the above arrangement will be noticed.

SEED.—The structure of a seed is best examined by soaking it in warm water for a few hours, when its coats may be removed, and its arrangement of parts may be seen, with the aid of a lens if the seed be small. A few large seeds should be experimented upon first, such as a broad bean, nux vomica seed, croton seed, almond, orange pip, &c. Small slippery seeds may be placed in a drop of gum or varnish, and sliced when the liquid is dry.

In using a lens it is very necessary to let the light fall *upon the object*. In examining a flower nothing must ever be *guessed* at, but every point ascertained with certainty by careful examination. If it be necessary to have both hands free for dissecting a small flower under the lens, small stands for the purpose of supporting a lens may be obtained of any optician.

Dried flowers should be soaked in boiling water before examination, and pulled to pieces under a lens.

The student should endeavour to make himself familiar with the types of each family, by procuring and examining whenever possible the plants enumerated in the Floral Calendar. After having examined the exceptions,(those marked with an asterisk), the principal types of the family will be better understood.

In examining those plants, which, like the Sunflower and Daisy, have the flowers arranged in heads, it must be remembered that each head consists of a number of distinct flowers (florets), and that, in order to trace out its family, only one of these florets should be separated and examined, and not the whole number of the outer florets counted. In these florets, the calyx is sometimes only developed as a slender tube adhering to the ovary, as in the Camomile ; and, in others, as in the Dandelion, in the form of a feathery expansion called pappus.

ON THE MICROSCOPICAL EXAMINATION OF PLANTS.

When flowers are so small as to require dissection under a magnifying glass, the most convenient manner of using the lens is to mount it on a small brass pillar inserted in a stand, so that it may move easily, but without slipping, upon the pillar. A test-tube holder with the end perforated so as to fit the pillar is a convenient piece of apparatus, as it will allow an ordinary lens to be held in position in the clasp at the end. The most useful magnifying glass for botanical purposes is one, which has a Coddington lens at one end, combined with a lens of about 1 inch focal distance at the other.

When the spores of cryptogams, stomata, cells, vessels, or other minute objects, have to be examined, a compound microscope becomes necessary. The cheapest and most useful that I have seen for the purposes of the student, is one, manufactured by Messrs. R. & J. Beck, which possesses the following qualifications :— a firm stand ; a rackwork, which is not so loose as to cause the object viewed to appear to jerk when the tube of the microscope is being moved into focus ; a fine adjustment screw ; an inch object glass, a $\frac{1}{4}$-inch object glass, and a B eyepiece. A bull's-eye or plano-convex condenser is necessary to throw the light upon opaque objects : this should be mounted upon a telescopic adjusting stand.

A very useful adjunct is the double nose-piece, since by its means an object can be found under the inch lens, and after the object has been placed exactly in the centre of the field of view, the $\frac{1}{4}$-inch object-glass can be brought to bear upon it by simply moving round the nose-piece.

A rough test for ascertaining whether the object-glass is fit for botanical purposes, will be to see if it can be focussed upwards and downwards through an object without the definition becoming confused. Another test is that a good microscopic photograph should appear under it, as sharply defined at the edges as in the centre.

For drawing objects under the microscope, a camera lucida or Beale's tint-glass reflector is necessary ; this is fitted on to the end of the tube to which the eye is applied ; the microscope tube being then placed in a horizontal position, and the eye made to look through the reflector or camera lucida, so that the lines which appear on a piece of paper placed on the table beneath it and the point of the pencil can be seen at the same time. This is rather difficult to do at first, and considerable practice is necessary before a drawing can be made easily and accurately. Two pairs of finely pointed steel forceps, and a pair of tweezers with broad accurately fitting edges, a few dissecting needles, and a knife with a very narrow blade, will be found very useful in dissecting. The dissecting needles may be made by fixing a stout needle into a penholder so far that the needle does not bend under light pressure.

The most important point in the use of the microscope is to manipulate the mirror in such a manner that the necessary amount of light is thrown upon the object. The mirror usually has two surfaces, one flat for projecting parallel rays of light, the other concave for collecting a beam of light and conveying it to a focal point upon the object. The object to be examined, if sufficiently thin to be transparent, is put in a drop of water on a glass slide, and a thin covering glass placed upon it. Light is then reflected upward upon it by manipulating the mirror, and the tube of the microscope carefully moved down until the object appears in view. The fine adjustment screw is then turned carefully until the object becomes clearly defined; if moved too far the object again appears confused. By pulling out the draw tube, *i.e.*, the tube into which the eye-piece fits, the object, or rather the image of the object, becomes still more magnified.

It is advisable, in purchasing a microscope, to enquire of what thickness the thin covering glass for the slides should be, as the object-glasses of some microscopes necessitate the use of thinner glass than others. It must also be remembered that, if any water escapes by accident on the top of the covering glass, the object will appear blurred and confused.* Soft chamois leather, kept for the purpose, should alone be used for cleaning the object-glass and eye-piece, as the glass of which lenses are made is soft and easily scratched by a grain of sand or any other hard substance.

In examining the spore-cases of ferns, or the asci of lichens and fungi, it is sometimes necessary to use pressure. In such cases the compressorium manufactured by Messrs. R. & J. Beck is the best that I have seen.

For cutting sections, the section-cutter obtainable from the same firm is one of the most useful that has yet appeared. A great deal of practice is necessary before a thin section can be cut successfully, as it is some time before the hand acquires that nicety of touch and careful gradation of force which is absolutely necessary for success. The knife or razor is usually moistened with proof spirit before cutting an object. If a razor be used, one side of it should be perfectly flat.

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* This is not the case with what are called immersion lenses, in using which a drop of water is placed between the object glass and the covering glass. Immersion lenses are, however, only used where higher powers than the inch are required.

To cut thin sections of algæ, such as Polysiphonia, a double-bladed or Valentin's knife must be used. In cutting, a direct forward pressure or sawing motion must be avoided, and a clean diagonal sweep made across the object to be cut.

In examining the cells or vessels of plants, a portion of the tissue may be boiled in water until soft, or if tough, in dilute liquor potassæ, and then teazed out with dissecting needles or forceps.

The white threads in the stem of the Garden Balsam will be found, when pressed flat, to contain annular, spiral, and reticulated vessels; the threads in the stalk of the leaf of the common fern (*Pteris aquilina*) will furnish scalariform vessels, and a longitudinal section of an oak twig will yield porous vessels and wood cells; a thin shaving of a lucifer match will exhibit punctated wood cells, and leaves of the common rush will shew beautiful stellate cells. A thin section of dried dandelion root shows laticiferous vessels well. Stomata are most easily seen by pulling off the skin or epidermis of leaves which have a glaucous or grey green hue, such as the broad bean, tulip, cabbage, &c.

Some opaque objects, such as pollen or Lycopodium, exhibit their structure and contents best when immersed in spirit of wine, oil, or turpentine, instead of water. Raphides may be found in most succulent and bulbous plants. Pollen grains may generally be made to emit their tubes by placing them in a drop of dilute sulphuric acid.

In order to determine the character of the tissue under examination, a solution of carmine and picric acid in ammonia may be used. Protoplasm absorbs the carmine and becomes of of that colour, while cellulose is not coloured by it, and the picric acid stains lignin or woody tissue yellow. Those who wish to obtain further information on these points, will do well to consult the Micrographic Dictionary, or any of the works on mounting microscopic objects which are sold by opticians.

DIRECTIONS FOR DESCRIBING A PLANT IN THE SCHEDULE.

Gather an entire plant when possible; if this be not convenient, notice the character of the lowest (radical) leaves and observe if they differ in shape, &c., from those of the stem (cauline leaves). Cut off and examine each organ in turn, and describe them in the order laid down at the top of every blank page, referring to the Glossary to find out the terms which best apply to the specimen in hand. The Glossary will be found to be arranged in such a manner that every term will be met with in the order in which it is required.

If the description of the plant be made out carefully and correctly, it will only be necessary to ascertain from the description the points which are noticed in the directions for using the Charts, in order to find out the class, sub-class, and natural order, to which the plant belongs.

If it be desirable to give the description in Latin, the following rules should be observed :—

1st. The name of each organ should be in the nominative case, and the parts belonging to the organ should be all described in the ablative case.

2nd. The parts should be described in the order of their development, beginning with the root or stem, and proceeding upwards to the flower.

3rd. The name of each organ should commence a sentence.

4th. In punctuating the description, adjectives relating to the same noun should be separated by commas; parts of the same organ by semicolons, and distinct organs by a period, thus :—

> Stem erect, herbaceous, succulent, square, smooth. Leaves alternate, compound; leaflets oblong, entire, smooth, mucronate; glands two, at the base of the petiole.

Under "Remarks," notes may be made of any striking peculiarity, or of anything that will tend to picture the habit of the plant

GLOSSARY.

ROOT, Rt. *(Radix, f.)*

CHARACTER—

SIMPLE *(simplex)*, not branched, *e.g.*, Carrot.

BRANCHED *(rāmōsus)*, *e.g.*, Wallflower.

FI'BROUS *(fibrōsus)*, consisting of slender fibres, *e.g.*, Grass.

TUBER'CULAR (*tūbercŭlātus*), consisting of fleshy knobs, or tubercules (*tūbercŭlum*), *e.g.*, Jalap.

FASCIC'ULATE-TUBER'CULAR, having the tubercules arranged in a tuft, *e.g.*, Dahlia, Lesser Celandine.

PAL'MATE-TUBER'CULAR, having the knobs divided in a palmate manner, *e.g.*, Orchis maculata.

SHAPE—*

AN'NULAR (*annŭlātus*), having a ringed appearance, *e.g.*, Ipecacuanha.

CON'ICAL (*cōnĭcus*), tapering downwards like an inverted cone, *e.g.*, Aconite.

CONTORT'ED (*contortus*), twisted, *e.g.*, Bistort, Polygala Senega.

FU'SIFORM (*fūsĭformis*), tapering to each end, *e.g.*, Radish, Jalap.

PRÆMORSE (*præmorsus*), terminating abruptly, as if broken or bitten off, *e.g.*, Scabiosa succisa.

STEM, St. *(Caulis, m.)*

POSITION—

(1). SUBTERRANEAN—

CORM (*cormus*), a solid, somewhat globular, enlargement of the base of the stem, *e.g.*, Crocus, Colchicum, Ranunculus bulbosus, Arum.

RHIZOME (*rhizōma*), a thickened prostrate stem with short internodes, having leaves or leaf-buds on its upper surface and roots on its lower, *e.g.*, Acorus Calamus, Orrisroot, Lastrea Filix-mas.

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* *The subterranean varieties of stems resemble roots in appearance, but differ in having scales and leaf-buds on them.* (*See stem*).

CREEPING STEM (*sŏbŏles*), a kind of slender rhizome with long internodes, *e.g.*, Triticum repens; Podophyllum (*often included under rhizoma, of which it is only a variety*).

TU'BER (*tūber*), an enlarged portion of an underground stem of a more or less rounded shape, *e.g.*, Potato, Artichoke, Pignut.

BULB (*bulbus*), this differs from a corm in consisting of fleshy scales, and may be regarded as a very short stem with a fleshy terminal leaf-bud, *e.g.*, Onion, Hyacinth, White Lily (*scaly bulb*), Garlic (*compound bulb*).

(2). AERIAL—

STOLON or **STOLE** (*stŏlon*), a prostrate leafy shoot from the base of an erect stem, *e.g.*, Ajuga reptans.

RUN'NER (*flăgellum*), a slender prostrate stem producing young plants at long intervals, *e.g.*, Strawberry.

OFFSET (*prŏpăgulum*), a short thick shoot ending in a rosette of leaves, *e.g.*, Houseleek.

CHARACTER—

HERBA'CEOUS (*herbăceus*), not forming wood, *e.g.*, Aconite, Poppy.

SUFFRU'TICOSE (*suffrŭtĭcōsus*), partly green and partly woody, *e.g.* Dulcamara, Fuchsia, Jasmine.

SHRUBBY (*frŭtĭcōsus*), having several woody stems arising from one root, *e.g.*, Lilac, Buckthorn.

ARBORES'CENT (*arbŏrescens*), having one woody stem (*trunk*) only, *e.g.*, Oak, Elm.

CÆS'PITOSE (*cæspĭtōsus*), growing in tufts, *e.g.*, Common Rush.

CONSISTENCE—

SUC'CULENT (*carnōsus*), very juicy, *e.g.*, Begonia, Cactus.

WOODY (*lignōsus*), hard and firm., *e.g.*, Bamboo.

FIS'TULOSE (*fistŭlōsus*), hollow or tubular, *e.g.*, Equisetum, Heracleum, Onion.

DIRECTION—

ERECT (*ērectus*), upright, *e.g.*, Pinus, Larix.

CLIMBING (*scandens*), having tendrils with which it becomes attached to and raised by other plants, *e.g.*, Bryonia, Vine, Vetch.

TWINING (*vŏlūbĭlis*), twisting around other plants, *e.g.*, Convolvulus arvensis, Calystegia.

PROCUM'BENT (*prōcumbens*), spreading widely on the surface of the ground without rooting, *e.g.*, Cucumber, Ground Ivy.

CREEPING (*rĕpens*), spreading on the ground and and rooting here and there, *e.g.*, Ranunculus repens, Potentilla anserina.

DECUM'BENT (*dĕcumbens*), bending downwards, *e.g.*, Vinca minor.

ASCEN'DING (*ascendens*), rising obliquely upwards, *e.g.*, Polygala vulgaris.

GENIC'ULATE (*gĕnĭcŭlātus*), bent at the nodes, *e.g.*, Alopecurus geniculatus.

SHAPE—

SQUARE (*quadrangŭlāris*), having four sides, *e.g.*, Scrophularia Marrubium, Mint.

TRIQUE'TROUS (*trĭquĕtrus*), having three concave sides, *e.g.*, Carex vulpina and C. divulsa.

TRIGO'NOUS (*trĭgōnus*), having three convex sides, *e.g.*, Carex ampullacea.

ANCIP'ITAL (*anceps*), having two sharp edges, *e.g,,* Narcissus.

TE'RETE (*tĕrēs*), tapering, but presenting a circular transverse section, *e.g.*, Rush.

COMPRES'SED (*compressus*), somewhat flattened, *e.g.*, Cactus Opuntia,

ANGU'LAR (*angŭlōsus*), having several sides, *e.g.*, Lythrum Salicaria, Broom.

SURFACE—

FUR'ROWED (*sulcātus*), having numerous longitudinal grooves, *e.g.*, Œnanthe crocata, Furze.

STRIA'TED (*strĭātus*), marked with numerous fine lines, *e.g.*, Juncus glaucus.

WINGED (*ālātus*), having two or more leafy margins, *e.g.*, Everlasting Pea, Cotton Thistle.

BRISTLY (*sētōsus*), covered with short stout hairs, *e.g.*, Moss Rose.

PRICKLY (*acŭlĕātus*), furnished with prickles, *i.e.*, hardened appendages of the epidermis, *e.g.*, Rose, Bramble.

THORNY or **SPINOSE** (*spīnōsus*), furnished with thorns in the axils or at the ends of branches, *e.g.*, Hawthorn, Buckthorn.

LEAF, L. *(Folium, n.)*

VENATION—

PAR'ALLEL (*recti-nervis*), having the small veins parallel, either longitudinally or transversely, *e.g.*, Iris, Orchis.

RETIC'ULATED (*rētĭcŭlāti-nervis*), the smaller veins forming an irregular network, *e.g.*, Digitalis.

RA'DIATE (*rădiāti-nervis*, *palmi-nervis*), having several large veins (*ribs*), converging to the leaf-stalk, *e.g.*, Mallow, Vine, Maple.

FEATHER-VEINED (*penni-nervis*), having the lateral veins proceeding from the mid-rib to the margin of the leaf. *e.g.*, Spanish Chestnut, Beech.

FURCATE (*furcāti-nervis*), each vein forking repeatedly, *e.g.*, Hart's Tongue Fern, Maidenhair.

MID'RIB (*nervus*, *costa mĕdia*), the large central vein in a leaf.

NERVES or **RIBS** (*costæ*), when there are several large veins they are so called, *e.g.*, Mallow, Maple.

POSITION—

RAD'ICAL (*rādīcālis*), near the root, *e.g*, Primrose.

SESS'ILE (*sessĭlis*), having no leaf-stalk, *e.g.*, White Poppy.

STALKED (*pĕtĭŏlātus*), furnished with a leaf-stalk, *e.g.*, Geranium.

ALTER'NATE (*alternus*), when no two leaves occupy the same level on the stem, *e.g.*, Oak.

OP'POSITE (*oppŏsĭtus*), when two leaves spring from opposite sides of the stem at the same level, *e.g.*, Fuchsia.

WHORLED (*vertĭcillātus*), when several leaves are arranged in a circle round the stem, *e.g.*, Rubia, Galium.

SECUN'D (*sĕcundus*),* when all the leaves are turned in one direction, *e.g.*, Hypnum cupressiforme.

DIS'TICHOUS (*distichus*), arranged closely in two rows, *e.g.*, Yew, Taxodium.

FASCIC'ULATE (*fascĭcŭlātus*), arranged in tufts, *e.g.*, Larch.

DIVISION—

SIMPLE (*simplex*), having no divisions, or divisions not extending to the mid-rib, *e.g.*, Mint, Ivy.

COMPOUND (*compŏsĭtus*), having two or more distinct pieces (leaflets), *e.g.*, Rose, Lupin.

ANG'ULAR (*angŭlātus*), having broad triangular divisions, *e.g.*, Ivy.

-LO'BED† (*lŏbātus*), having broad, rather deep, divisions, *e.g.*, Fig.

-SECT† (*sectus*), having narrow deep divisions.

-FID† (*fĭdus*), divided halfway to the mid-rib, *e.g.*, Polypodium.

-PAR'TITE† (*partītus*), cleft almost to the mid-rib, *e.g.*, Polypody.

PALMA'TELY (*palmātim*), having the divisions following the veins of a radiate-veined leaf.

PINNA'TELY (*pinnāti-*), having the divisions following the veins of a feather-veined leaf.

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* *Secund leaves are more common in mosses than in flowering plants.*

† *These terms are usually found in combination, thus—palmatifid, pinnately-cleft, bi-fid, tri-fid, &c.*

-NATE or **-FOLIATE** (*-natus*, *-foliatus*), having distinct leaflets.

BINATE or **BIFOLIATE**, having two leaflets, *e.g.*, Hymenæa, Jeffersonia diphylla.

TERNATE or **TRIFOLIATE**, having three leaflets, *e.g.*, Menyanthes trifoliata, Oxalis, Clover.

BITERNATE, twice divided into three leaflets, *e.g.*, Actæa.

TRITERNATE, three times divided into three leaflets, *e.g.*, Epimedium.

REPEATEDLY TERNATE, *e.g.*, Ferula persica.

QUATERNATE or **QUADRIFOLIATE**, having four leaflets, *e.g.*, Paris quadrifolia, Marsilea.

QUINATE or **QUINQUEFOLIATE**, having five leaflets, *e.g.*, Potentilla reptans.

SEPTENATE, having seven leaflets, *e.g.*, Horse Chestnut.

DIGITATE or **MULTIFOLIATE** (*dĭgĭtatus*), having numerous radiating leaflets, *e.g.*, Lupin.

PINNA'TE (*pinnātus*), having distinct leaflets arranged like the veins of a feather-veined leaf, *e.g.*, Vetch, Elder.

PARI-PINNA'TE (*pări-pinnātus*), having the leaflets in pairs.

IM'PARI-PINNA'TE (*impărĭ-pinnātus*), having the leaflets in pairs with a terminal odd one, *e.g.*, Ash, Rose.

LYRA'TE-PINNA'TE (*lyrāti-pinnātus*), having the terminal leaflet larger than the others, *e.g.*, Barbarea vulgaris, Watercress.

INTERRUPTEDLY PINNATE (*interrupte-pinnātus*), having small irregular leaflets between the ordinary leaflets, *e.g.*, Meadow Sweet, Silver Weed.

LEAFLETS (*fŏliōla*), the divisions of a compound leaf.

PINNÆ (*pinnæ*), the primary divisions of a bi- or tri-pinnate leaf.

RA'CHIS (*răchis*), the main stalk running through a repeatedly pinnate leaf, *e.g.*, Male Fern, Fennel.

STIPE (*stīpes*), the portion of the leaf-stalk in ferns which has no leaflets upon it, *e.g.*, Male Fern, Maidenhair Spleen wort.

SHAPE—

LIN'EAR (*līneāris*), many times longer than broad, and of nearly the same width throughout, *e.g.*, Grass, Yew.

ACIC'ULAR (*ăcĭcŭlāris*, *ăcĕrōsus*), needle-shaped, *e.g.*, Scotch Fir, Larch.

SUB'ULATE (*sūbŭlātus*), awl-shaped, *e.g.*, Juniper.

SWORD-SHAPED (*ensĭformis*), *e.g.*, Acorus Calamus, Iris.

LAN'CEOLATE (*lancĕŏlātus*), broadest in the centre and tapering to each end, *e.g.*, Plantago lanceolata, Mezereon.

O'VAL (*ovālis*), broadest in the middle and obtuse at the ends, and two or three times longer than broad.

OB'LONG (*oblongus*), like an oval leaf, but three to four times longer than broad.

OVA'TE* (*ŏvātus*), egg-shaped, the widest end being near the petiole, *e.g.*, Chickweed, Greater Periwinkle.

CORDATE (*cordātus*), resembling in shape the heart on a pack of cards, the broad end being near the leaf-stalk, *e.g.*, Lilac.

REN'IFORM (*rĕnĭformis*), kidney-shaped, *e.g.*, Ground Ivy, Asarabacca.

SAG'ITTATE (*săgittātus*), resembling in shape an arrow-head, *e.g.*, Arum, Sagittaria.

HASTATE (*hastātus*), shaped like an arrow-head, *e.g.*, Rumex Acetosella, Atriplex hastata.

AURIC'ULATE (*aurĭcŭlātus*), having two nearly distinct lobes at the base of the leaf, *e.g.*, Dulcamara.

PED'ATE (*pĕdātus*), a compound leaf of three or more leaflets, with the two lateral leaflets divided, *e.g.*, Helleborus fœtidus.

ORBIC'ULAR (*orbĭcŭlātus*), nearly circular, *e.g.*, Tropœolum.

CU'NEATE (*cŭneātus*), wedge-shaped, *e.g.*, Maidenhair Fern.

SPATHULATE (*spăthŭlātus*), shaped like a spoon or spatula, *e.g.*, London Pride.

MARGIN—

SERRATE† (*serrātus*), having teeth whose tips point towards the apex of the leaf, *e.g.*, Dead Nettle, Rose, Valerian, Elder.

CRE'NATE (*crĕnātus*), having teeth with convex equal sides, *e.g.*, Mallow, Digitalis, Ground Ivy.

DEN'TATE (*dentātus*), having teeth with concave sides, *e.g.*, Stramonium, Henbane.

INCI'SED (*incīsus*), having sharp long irregular teeth, *e.g.*, Aconite.

SIN'UATE (*sĭnŭātus*), having broad large teeth, *e.g.*, Oak, Stramonium.

UN'DULATE or **SIN'UOUS** (*undŭlātus*), wavy. *e.g.*, Bay, Rumex crispus, Acorus Calamus.

RUN'CINATE (*runcĭnātus*), having coarse teeth pointing towards the petiole, *e.g.*, Dandelion.

ENTIRE (*intĕger*), not toothed, *e.g.*, Mezereon, Belladonna, Lilac.

CIL'IATE (*cĭlĭātus*), having a fringe of hairs, *e.g.*, Luzula pilosa, Erica tetralix, and E. ciliaris.

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* *The prefix ob applied to the words lanceolate, ovate, cordate, etc., implies that the apex of the leaf is wider than the base, e.g., obovate,* Cassia obovata; *obcordate*, Oxalis, Clover.

† *The prefix bi is used when the teeth are large and again toothed,* e.g., *biserrate*, Hazel; *bicrenate*, Hydrocotyle; *bidentate.*

PRICKLY (*acūlĕātus*), having veins proceeding beyond the margin in the form of hard sharp points, *e.g.*, Thistle.

IN'VOLUTE (*invŏlūtus*), rolled in at the margin towards the upper surface of the leaf, *e.g.*, Violet.

REV'OLUTE (*rĕvŏlūtus*), rolled in at the margin towards the under surface of the leaf, *e.g.*, Rumex.

SCA'RIOUS (*scărĭōsus*), dry and membranous, *e.g.*, Cerastium triviale.

APEX—

ACU'MINATE (*ăcūmĭnātus*), tapering to a sharp point.

ACUTE (*ăcūtus*), pointed, but not tapering much.

CUS'PIDATE (*cuspĭdātus*), suddenly tapering to a rigid point.

MU'CRONATE (*mūcrōnātus*), having the mid-rib of the leaf exceeding the apex in the form of a minute point, *e.g.*, Vetch.

EMAR'GINATE (*ēmargĭnātus*), having a sharp notch at the apex, *e.g.*, Oxalis.

RETUSE (*rĕtūsus*), having a shallow broad notch at the apex.

BASE—

OBLIQUE (*oblīquus*), unequal at the base, one-half of the leaf being larger than the other, *e.g.*, Elm, Begonia, Tilia. Limes

PEL'TATE (*peltātus*), the bases of the leaf united, so that the stalk comes from near its centre, *e.g.*, Tropœolum, Podophyllum peltatum, Cotyledon Umbilicus.

SES'SILE (*sessĭlis*), having no leaf-stalk, *e.g.*, Mentha sativa.

SHEATHING (*vāgĭnātus*), enclosing a portion of the stem, *e.g.*, Grass, Angelica.

AMPLEX'ICAUL (*amplexĭcaulis*), clasping the stem, but not enclosing it, *e.g.*, Sonchus, White Poppy.

PERFO'LIATE (*perfŏlĭātus*), the bases of the leaf united, so that the stem appears to pass through it, *e.g.*, Bupleurum rotundifolium, Uvularia.

CON'NATE (*connātus*), when the bases of two opposite leaves are united, *e.g.*, Chlora perfoliata, Teazle.

DECUR'RENT (*dēcurrens*), forming ridges down the stems, *e.g.*, Comfrey, Thistle.

CONSISTENCE—

CORIA'CEOUS (*cŏrĭāceus*), tough and leathery, *e.g.*, Bay, Cherry Laurel.

FLESHY (*carnōsus*), thick and juicy, *e.g.*, Houseleek.

HERBA'CEOUS (*herbāceus*), green and soft, *e.g.*, Belladonna.

SURFACE—

GLA'BROUS (*glăber*), quite smooth, *e.g.*, Lilac.

GLAU'COUS (*glaucus*), having a greyish or bluish-green tint, *e.g.*, Eryngium maritimum.

PILOSE (*pĭlōsus*), having soft scattered short hairs. *e.g.*, Hieracium Pilosella.

PUBES'CENT (*pūbescens*), densely covered with short soft hairs, *e.g.*, Geranium molle, Digitalis, Hounds-tongue.

VIL'LOSE (*villōsus*), densely covered with long soft hairs, *e.g.*, Stachys Germanica, peduncle of Primrose.

TOMENTO'SE (*tōmentōsus*), densely covered with very short, rather stiff, hairs, *e.g.*, Lavatera arborea.

WOOLLY (*lānātus*), covered with densely matted hairs, *e.g.*, Verbascum Thapsus.

HIS'PID (*hispĭdus*), having long rigid hairs, *e.g.*, Bugloss, Viper's Bugloss.

SCA'BROUS (*scăber*), rough to the touch from the presence of short rigid points, *e.g.*, Comfrey.

SILK'Y (*sērĭceus*), having fine glossy hairs closely pressed to the leaf, *e.g.*, Alchemilla alpina.

DOT'TED (*punctātus*), having transparent dots, *e.g.*, Hypericum, Rue, Myrtle.

VIS'CID (*glūtĭnōsus*), furnished with gland-tipped hairs, *e.g.*, Henbane.

APPENDAGES or Modifications—

TEN'DRIL (*cirrhus*), thread-like processes by which a climbing plant supports itself, *e.g.*, Bryonia dioica, Pea, Vetch, Vine, Sarsaparilla.

PHYLLODE (*phyllōdus*), a petiole flattened so as to resemble a leaf, *e.g.*, Acacia armata.

STIP'ULE, Stip. *(Stipula, f.)*

CHARACTER—

OC'REATE (*ōcrĕātus*), forming a membranous sheath around the stem, *e.g.*, Bistort, Dock.

INTERPET'IOLAR (*interpĕtĭōlāris*), situated between two opposite leaves, *e.g.*, Hop, Bouvardia.

SCAR'IOUS (*scărĭōsus*), membranous and dry, *e*.g., Geranium.

SHAPE—

(The terms used for Leaves are applicable to Stipules.) See p. 19.

ATTACHMENT—

AD'NATE (*adnātus*), attached to the petiole, *e.g.*, Potentilla fragariastrum, Rose.

FREE (*līber*), distinct from the petiole, *e.g.*, Mallow, Geranium, Begonia.

INFLORES'CENCE, Infl. *(Inflorescentia, f.)*

CENTRIP'ETAL (*centripĕtālis*), opening from base to apex, or from circumference to centre.

SCAPE (*scăpus*), when the flower-stalk proceeds from the ground and is destitute of leaves, *e.g.*, Hyacinth, Lily of the Valley, Primrose.

AX'ILLARY (*axillāris*), springing from the axil of the leaves, *e.g.*, Pimpernel, Fuchsia.

SPIKE (*spīca*), having the flowers sessile on the main stalk.

DENSE (*densus*), having the flowers crowded together, *e.g.*, Plantain.

LOOSE (*laxus*), having the flowers widely separated, *e.g.*, Vervain.

UNILAT'ERAL or **SECUND** (*unĭlătĕrālis*), having the flowers all turned in one direction, *e.g.*, Spiranthes, Foxglove.

SPIKE'LET (*lŏcusta*), the small spikes found in grasses and sedges, *e,g.*, Carex riparia, Bromus, Wheat.

CAT'KIN (*āmentum*), a spike of unisexual flowers which falls away after flowering or fruiting, *e.g.*, Hazel, Willow, Poplar.

SPA'DIX (*spādix*), a spike having a succulent axis and usually crowded with flowers, and generally enclosed in a sheathing bract, *e.g.*, Arum, Acorus.

RACE'ME (*răcēmus*), resembling a spike in appearance, but the flowers having stalks of nearly equal length, *e.g.*, Shepherd's Purse.

PAN'ICLE (*pănĭcŭla*), a compound raceme, *e:g.*, Oat.

COR'YMB (*cŏrymbus*), having the pedicels arising from different points, but reaching to nearly the same level, *e.g.*, Hawthorn.

UM'BEL (*umbella*), having the pedicels starting from one point and reaching nearly the same level, *e.g.*, Conium, Polyanthus.

HEAD (*căpĭtŭlum*), having a number of flowers sessile on an enlarged receptacle, *e.g.*, Dandelion, Thistle.

CENTRIF'UGAL (*centrifŭgālis*), this term includes all inflorescences opening from the centre to the circumference or from the apex to the base.

CYME (*cyma*), a generic name for centrifugal inflorescences, thus—

SPIKED (*spicatus*), like a spike, *e.g.*, Metrosideros.

RACEMO'SE (*răcēmōsus*), like a raceme, *e.g.*, Harebell.

CORYM'BOSE (*cŏrymbōsus*), like a corymb, *e.g.*, Centaury, Sweet William. (*In the latter plant the inflorescence is sometimes called a fascicled cyme.*)

PAN'ICLED (*pānĭcŭlātus*), like a panicle, *e.g.*, London Pride.

UM'BELLATE (*umbellātus*), like an umbel, *e.g.*, Elder, Geranium.

THYRSE (*thyrsus*), a dense panicled cyme, *e.g.*, Privet, Lilac.

VERTICIL'LASTER (*vertĭcillaster*), two dense axillary cymes, looking like a whorl, *e.g.*, White Horehound, Pennyroyal.

SCOR'PIOID (*scorpĭoideus*), a cyme with coiled branches, *e.g.*, Heliotrope, Comfrey.

BRACTS, Br. *(Bractea, f.)*

CHARACTER—

FOLIA'CEOUS (*fŏlĭāceus*), resembling leaves in shape and colour, *e.g.*, Helleborus fœtidus.

SCA'LY (*squamæformis*), small, and resembling scales in appearance, *e.g.*, Coltsfoot.

SPATHA'CEOUS (*spathāceus*), enclosing the buds, *e.g.*, Iris.

PET'ALOID (*pĕtăloideus*), coloured like petals, *e.g.*, Salvia, Arum.

AWNED (*cristātus*), having the mid-rib prolonged in the form of a bristle, *e.g.*, Bromus, Barley.

ARRANGEMENT—

CU'PULE (*cupula*), a cup formed of bracts more or less united, *e.g.*, Oak, Spanish Chestnut, Beech.

INVOLU'CRE (*invŏlūcrum*), one or more rows of bracts surrounding an inflorescence, as in the umbel and capitulum, *e.g.*, Astrantia, Æthusa, Centaurea, Dandelion.

PHYLLARIES (*invŏlūcri bracteæ*), the bracts of the involucre of a capitulum.

PA'LEÆ (*păleæ*), the chaffy bracts surrounding or subtending the flowers in grasses or capitula, *e.g.*, Bromus erectus, Anthemis.

GLUMES (*glūma*), the bracts (usually two) which do not contain flowers, at the base of the spikelets in grasses, or beneath each flower in the sedges, *e.g.*, Carex pendula, Festuca uniglumis, Bromus.

EPICA'LYX (*bractĕŏlæ*), a row of bracts attached to the calyx, *e.g.*, Geum urbanum, Malva.

SE'PALS, Sep. *(Sepalum, n).*

ADHERENCE—

ADHE'RENT or SUPE'RIOR (*sŭpĕrus*), having the tube of the calyx united to the ovary, *e.g.*, Lobelia, Bryonia, Fuchsia.

FREE or INFE'RIOR (*infĕrus*), having the tube of the calyx free from the ovary, *e.g.*, Almond, Cherry, Buttercup.

COHERENCE—

MONOSEP'ALOUS (*gămŏsĕpălus*), the calyx consisting of sepals more or less united, the united portion being called the tube (*tŭbus*), and the free portion the limb (*limbus*), *e.g.*, Silene, Fuchsia, Almond, Cherry.

POLYSEP'ALOUS *pŏlysĕpălus*), the calyx consisting of sepals quite free from each other, *e.g.*, Buttercup.

COLOUR—

PET'ALOID (*pĕtăloīdĕus*), when the calyx is of any other colour than green, *e.g.*, Fuchsia, Anemone, Mezereon.

PER'IANTH (*pĕrĭanthĭum*), this term is used collectively for the calyx and corolla when they are so similar in appearance and colour as to be only distinguishable by evidently forming two whorls, *e.g.*, Orchis, Snowdrop, Hyacinth, Lily of the Valley. (See p. 9.)

PERSISTENCE—

PERIGO'NE (*pĕrĭgōnĭum*), a name applied to an enlarged, persistent usually warty, calyx, *e.g.*, Polygonum, Atriplex.

CADU'COUS (*cădūcus*), falling off as the flower opens, *e g.*, Poppy.

DECID'UOUS (*dĕcĭduus*), falling off after flowering, *e.g.*, Buttercup.

PERSIS'TENT (*persistens*), remaining until the fruit is ripe, *e.g.*, Strawberry, Apple.

CALYP'TRATE (*călyptrātus*), the sepals remaining in the form of a cap, and separating transversely from the flower, *e.g.*, Eschscholtzia, Eucalyptus.

PAP'PUS (*pappus*), a feathery expansion of the limb of the calyx.*

ÆSTIVATION—

IM'BRICATE (*imbrĭcātus*), overlapping at the edges or tips, *e.g.*, Convolvulus.

VAL'VATE (*valvātus*), not overlapping, but meeting at the edges, *e.g.*, Fuchsia, Mallow, Dulcamara.

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* *In some cases the pappus is apparently formed of modified bracts.*

SHAPE—

TU'BULAR (*tŭbŭlātus*), having the sepals united through more than half their length, *e.g.*, Mint.

SPURRED (*calcărātus*), having a tubular appendage, *e.g.*, Larkspur, Tropœolum.

INFLA'TED (*inflātus*), the tube of the calyx being much larger in proportion than the corolla tube, *e.g.*, Silene inflata, Primula sinensis.

PETALS, Pet. (*Petalum, n*).

COHERENCE—

MONOPET'ALOUS (*gămŏpĕtălus*), the corolla consisting of petals more or less united, the united portion being called the tube (*tŭbus*), and the divided portion being called the limb (*limbus*), while the mouth of the tube is called the throat (*faux*), *e.g.*, Primrose, Borage, Comfrey.

POLYPET'ALOUS (*pŏlypĕtălus*), the corolla consisting of petals quite free from each other, *e.g.*, Buttercup., Wallflower, Mallow.*

SHAPE OF COROLLA—

REG'ULAR (*rēgŭlāris*), the corolla having all the petals of equal size, *e.g.*, Rose, Buttercup.

IRREG'ULAR (*irrēgŭlāris*), the corolla having some petals larger than the others, *e.g.*, Veronica, Geranium, Broom, Dead Nettle.

REGULAR MONOPETALOUS COROLLAS.

TU'BULAR (*tŭbŭlātus*), shaped like a tube, *e.g.*, Stramonium, Solomon's Seal.

URCE'OLATE (*urcĕŏlātus*), shaped like a vase or pitcher, *e.g.*, Erica cinerea, Whortleberry, Strawberry Tree.

FUN'NEL-SHAPED (*infundĭbŭlĭformis*), *e.g.*, Convolvulus.

BELL-SHAPED (*campănŭlātus*), *e.g.*, Belladonna, Canterbury Bell.

SAL'VER-SHAPED (*hypocrātērĭformis*), having a long tube and spreading limb, *e.g.*, Primrose, Jasmine, Phlox.

RO'TATE (*rŏtātus*), having a very short tube and spreading limb, *e.g.*, Forget-me-not, Dulcamara, Borage.

SAU'CER-SHAPED† (*ăcētăbŭlĭformis*), like the last, but having a concave cup-shaped limb, *e. g.*, Henbane.

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* *Sometimes the petals of a polypetalous corolla are apparently united, as in the mallow, but are in reality only attached to the tube (androphore) formed by the union of the filaments.*

† *Sometimes the above corollas are slightly irregular, e.g., Veronica, Mullein.*

Irregular Monopetalous Corollas.

STRAP-SHAPED (*lĭgŭlātus*), having a slender tube terminating in a flat and linear corolla, *e.g.*, Dandelion, outer florets of Daisy.

RIN'GENT (*ringens*), a labiate or two-lipped corolla in which the lips are widely separated, *e.g.*, Dead Nettle, Salvia.

PER'SONATE (*persōnātus*), a labiate corolla having the two lips closed, *e.g.*, Snapdragon, Toadflax.

CALCE'OLATE (*calcĕĭformis*), more or less slipper-shaped, *e.g.*, Cypripedium, Calceolaria.

Regular Polypetalous Corollas.

CRU'CIATE (*crŭcĭātus*), having four unguiculate petals arranged in the form of a Maltese cross, *e.g.*, Wallflower, Stock, Cuckoo Flower.

CARYOPHYLLA'CEOUS (*căryōphyllācĕus*), having five equal clawed petals, *e.g.*, Lychnis, Silene, Sweet William.

ROSA'CEOUS (*rŏsācĕus*), like the last, but the petals having a very short claw, *e,g.*, Rose, Buttercup.

Polypetalous Irregular Corrolas.

PAPIL'IONA'CEOUS (*pāpĭlĭonāceus*), butterfly-shaped, *e.g.*, Pea, Bean, Broom, Furze, Clover.

SHAPE OF PETALS—

LABEL'LUM (*lăbellum*), the large irregular petal of an orchis, *e.g.*, Orchis maculata, Dendrobium nobile.

SPURRED (*calcărātus*), having a prolonged (usually tubular) appendage at the base, *e.g.*, Violet, Columbine, Larkspur, Pelargonium, Red Valerian.

GIB'BOUS (*gibbus*), having a small inflation at the base, *e.g.*, Valeriana officinalis, Snapdragon.

ARCHED (*arcŭātus*), curved, as in the upper lip of many labiate flowers, *e.g.*, White Dead Nettle.

ÆSTIVATION—

VAL'VATE (*valvātus*), meeting at the edges, not overlapping, *e.g.*, Privet, Lilac, Dulcamara.

IM'BRICATE (*ĭmbrĭcātus*), overlapping at the tip or sides, *e.g.*, Belladonna, Rose.

CON'VOLUTE (*convŏlūtus*), deeply overlapping at the sides, *e.g.*, Poppy.

PLAITED (*plĭcātus*), folded like a fan or frill, *e.g.*, Convolvulus.

TWIS'TED (*contortus*), twisted like a screw, *e.g.*, Malva.

CRUM'PLED (*corrŭgātus*), irregularly cramped or folded in the bud, *e.g.*, Poppy, Rock Rose.

PERSISTENCE—

FUGA'CIOUS (*fŭgāx*), falling off when touched or shaken, Poppy, Flax, Rock Rose.

DECID'UOUS (*dēcĭduus*), falling off when the flower is fertilised, *e.g.*, Buttercup.

MARCES'CENT (*marcescens*), withering, but not falling off, *e.g.*, Canterbury Bell, Centaury.

CORONA.

This is a tube found in many of the Amaryllidaceæ between the stamens and corolla, and sometimes evidently consisting of the united wings of the filaments, *e.g.*, Eucharis, Pancratium.

STAMENS, Stam. *(Stamen, n.).*

POSITION—

HYPOG'YNOUS (*hypŏgynus*), attached to the thalamus, *i.e.*, beneath the ovary, *e.g.*, Poppy, White Lily, Aconite.

PERIG'YNOUS (*pĕrĭgynous*), attached to the calyx or perianth, often very near the base, *e.g.*, Fuchsia, Geum, Rosa, Broom.

EPIPET'ALOUS (*ĕpĭpĕtălus*), attached to the petals, *e.g.*, Dulcamara, Digitalis, Primula, Lamium album.

EPIG'YNOUS (*ĕpĭgynus*), apparently attached to the top of the ovary, *e.g.*, Conium, Campanula, Deutzia.

GYNAN'DROUS (*gynandrus*), having the stamen or stamens adherent to the style or stigma, *e.g.*, Orchis maculata, Dendrobium, Aristolochia, Stephanotis.

ARRANGEMENT—

PER'FECT (*hermaphrodītus*), having stamens and pistils in each blossom.

MONŒ'CIOUS (*mŏnoicus*), the stamens in one blossom and the pistils in another on the same plant, *e.g.*, Ecballium officinarum.

DIŒ'CIOUS (*dĭoicus*), stamens only in all the blossoms of one plant, and pistils only in all the blossoms of another, *e.g.*, Bryonia dioica.

POLYG'AMOUS (*pŏlygămus*), having stamens and pistils in one blossom, stamens only in another, and pistils only in another, in the same plant.

COHERENCE—

MONADEL'PHOUS (*mŏnădelphus*), having the filaments united into one bundle or tube (*androphore*), *e.g.*, Mallow.

DIADEL'PHOUS (*dĭădelphus*), having the stamens arranged in two bundles, *e.g.*, Dielytra, Broom.

POLYADEL'PHOUS (*pŏlyădelphus*), having the stamens arranged in three or more bundles, *e.g.*, Hypericum, Orange.

NUMBER—*

DEF'INITE, having less than 20 stamens.

INDEF'INITE, having more than 20 stamens.

DIDYN'AMOUS (*dĭdynămus*), having two stamens longer than the other two, *e.g.*, Lamium, Foxglove.

TETRADYN'AMOUS (*tetrădynămus*), having four stamens longer than the other two, *e.g.*, Arabis, Stock.

FILAMENT, Fil. (*Filamentum, n.*).

CAPIL'LARY (*căpillāris*), hair-like, and bending under the weight of the anther, *e.g.*, Grasses.

PET'ALOID (*pĕtăloideus*), flattened so as to resemble a petal, *e.g.*, Deutzia, Water Lily.

GLAN'DULAR (*glandŭlāris*), having glandular appendages at its base, *e.g.*, Bay.

ANTHER, Anth. (*Anthera, f.*)

COHERENCE—

SYNGENE'SIOUS (*syngĕnĕsius*), united wholly or through part of their length into a tube, *e.g.*, Centaurea, Lobelia, Jasione montana.

DEHISCENCE—

LONGITU'DINAL (*rīma dĕhiscens*), opening by a slit from apex to base, *e.g.*, Iris, Tulip.

PO'ROUS (*pōro dĕhiscens*), opening by a pore, or short slit, at the apex of each anther lobe, *e.g.*, Rhododendron, Polygala, Heath, Dulcamara.

VAL'VULAR or **VALVATE** (*valvŭla dehiscens*), opening by oblong lids, which curl upwards from the base of the anther, *e.g.*, Barberry, Bay.

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* *In works written in Latin, the number of stamens under 20 is usually mentioned, and the sign ∞ is used where the stamens are indefinite.*

TRANVER'SE (*transverse dĕhiscens*), opening apparently by a transverse slit, *e.g.*, Mallow.

EXTROR'SE (*postĭcus*), having the pollen turned away from the pistil, *e.g.*, Iris, Uvularia, Veratrum.

INTROR'SE (*antĭcus*), having the pollen turned towards the pistil, *e.g.*, Lily, Tulip.

ADHERENCE—

SES'SILE (*sessĭlis*), attached to the corolla or perianth, Dulcamara, Primula, Hyacinth.

INNA'TE (*innātus*), when the top of the filament terminates in a narrow connective, *e.g.*, Rose, Poppy.

ADNA'TE (*adnātus*), when the filament does not terminate in a narrow connective, or is continuous with a broad connective, *e.g* , Liriodendron, Lamium.

VER'SATILE (*versātĭlis*), adhering by its centre only to the filament, *e.g.*. Cobæa.

APPENDIC'ULATE (*appendĭcŭlātus*), having prolongations at the base or apex, *e.g.*, Violet, Heath.

DISTRAC'TILE (*anthĕræ dimĭdĭātæ, connectivæ productæ*), having the connective elongated so as to widely separate the anther lobes, one of which is often barren, *e.g.*, Salvia.

SHAPE—

REN'IFORM (*rēnĭformis*), kidney-shaped, *e.g.*, Mallow.

SIN'UOUS (*anfractuosus*), having somewhat the shape of the letter S *e.g.*, Bryonia, Ecballium, Cucumber.

CARPELS, Carp. *(Carpellum, n).*

COHERENCE—

O'VARY (*ŏvārĭum*), this term is applied to the portion of the flower containing the seeds, whether composed of one or more carpels.

SYNCAR'POUS (*syncarpĭcus*), consisting of two or more united carpels, *e.g.*, Digitalis, Henbane.

APOCAR'POUS (*ăpŏcarpĭcus*), having the carpels distinct from one another in the same flower, *e.g.*, Aconite.

NUMBER—

SIMPLE (*simplex*), of one carpel, *e.g.*, Barberry, Almond.

COMPOUND (*compŏsĭtus*), of more than one carpel, either distinct or united, *e.g.*, Aconite, Poppy.

POSITION—

SUPE'RIOR (*sŭpĕrus*), the ovary visible inside the flower, *e.g.*, Primrose.

INFE'RIOR (*infĕrus*), the ovary united to the calyx tube, *e.g.*, Fuchsia.

PLACENTATION—

AX'ILE (*plăcentæ axiles*), having the seeds attached to a central column connected to the sides of the ovary by dissepiments, *e.g.*, Henbane, Stramonium.

FREE CENTRAL (*plăcentæ centrales*), having the seeds attached to a central column which is not connected with the sides of the ovary, *e.g.*, Corn Cockle.

PARI'ETAL (*plăcentæ parietales*), having the seeds attached to the sides of the ovary or to projections from it, *e.g.*, Gentian, Violet, Poppy.

DEHISCENCE—

TRANS'VERSE (*dehiscens circumscisse*), opening by a lid when ripe, *e.g.*, Henbane, Pimpernel.

POROUS (*D. ŏpercŭlātim*), opening by holes at the base or apex, *e.g.*, Lobelia, Campanula, Red Poppy, Snapdragon.

SEPTICI'DAL (*D. septĭcīde*), splitting into its component carpels, *i.e.*, opening through the dissepiments, *e.g.*, Colchicum.

SEPTIFRA'GAL (*D. septĭfrāge*), breaking away from the edges of the dissepiments, *e.g.*, Stramonium.

LOCULICI'DAL (*D. lŏcŭlĭcīde*), opening by valves, each bearing the dissepiment on its centre, *e.g.*, Iris.

SU'TURAL (*D. follĭcŭlātim*), when a single carpel opens along its inner surface, leaving the seeds attached to the margins, *e.g.* Hellebore, Aconite.

STYLE—

AP'ICAL (*termĭnālis*), arising from the top of the ovary or carpel, *e.g.*, Primrose.

BAS'ILAR (*băsĭlāris*), arising from the base of the carpels, *e.g.*, Anchusa, Cynoglossum, Borage.

STYLOPO'DIUM, an enlargement of the base of the style in the form of a disk, *e.g.*, Conium, Fennel.

STIGMA—

SES'SILE (*sessĭlis*), growing on the top of the ovary, *e.g*, Poppy.

RA'DIATE (*radiatus*), when several stigmas are sessile, and radiate from a central point, *e.g.*, Poppy.

CAP'ITATE (*căpĭtātus*), when the style ends in a small knob like the head of a pin, *e.g.*, Primrose.

FEATHERY (*plūmōsus*), ending in a thread covered with hairs, *e.g.*, Grass.

PET'ALOID (*pĕtăloideus*), flat and petal-like, *e.g.*, Iris.

RECEPTACLE, Thal. *(Thalamus, m.)*

CARP'OPHORE (*carpophŏrum*), when the thalamus forms a stalk between the carpels, the latter separating from it when ripe, *e.g.*, Geranium, Fennel, Anise.

GYNO'PHORE (*gynophŏrum*), elongated into a stalk between the calyx or involucre and ovary, *e.g.*, Euphorbia, Silene.

DISK (*discus*), a growth around the base of the ovary, or between it and the stamens, *e.g.*, Pæonia, Ruta, Cobæa.

FRUIT, Fr. *(Fructus, n.)*

PER'ICARP (*pĕrĭcarpĭum*), the walls of the ovary and its attached parts, *e.g.*, Poppy, Orange, Acorn.

SAR'COCARP (*sarcŏcarpĭum*), all the fleshy part of a fruit is so called, whether composed of the ovary only or of the calyx-tube also, *e.g.*, Plum, Quince, Almond.

EP'ICARP (*exŏcarpĭum*), the outer layer of the pericarp, *e.g.*, skin of Plum.

MES'OCARP (*mĕsŏcarpĭum*), the middle layer of the pericarp, *e.g.*, flesh of Plum.

EN'DOCARP (*endŏcarpĭum*), the inmost layer of the pericarp, *e.g.*, stone of Plum.

DRY—

CARYOP'SIS.—A one-seeded indehiscent fruit, with an adherent pericarp, *e.g.*, Maize, Wheat.

ACHE'NE (*achēnium*), a small indehiscent seed-like carpel or syncarpous fruit, *e.g.*, Rumex, Carex, Buttercup, Dandelion.

NUT (*glans*),* a one-seeded indehiscent fruit, with a dry hard pericarp, *e.g.*, Acorn, Hazel nut.

CREM'OCARP (*crĕmŏcarpĭum*), a fruit consisting of two inferior carpels (mericarps), attached by their faces (commissure), and dehiscing when ripe from a carpophore, *e.g.*, Myrrhis, Fennel, Heracleum.

FOL'LICLE (*follĭcŭlus*), a carpel opening on one side only, and containing several seeds, *e.g.*, Aconite, Hellebore.

LEG'UME (*lĕgūmen*), a carpel containing many seeds and opening on both sides, *e.g.*, Cassia Fistula, Ornithopus, Pea, Bean.

POUCH (*sĭlĭqua*), a two-celled fruit, in which the two carpels separate from a membranous partition to which the seeds are attached, *e.g.*, Thlaspi, Lunaria, Mustard.

CAP'SULE (*capsŭla*), a one or more celled dehiscent fruit, with seeds attached to the axis, sides or base, *e.g.*, Henbane, Stramonium, Poppy, Corncockle.

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* *This name is applied by some botanists to the fruit of the Boraginaceæ, Labiatæ, Cyperaceæ, and Polygonaceæ; others call the fruits of the Labiatæ and Boraginaceæ "pyrenes."*

FLESHY—

CAR'CERULE (*carcerŭlus*), a single row of achenes attached to a short central axis, *e.g.*, Mallow.

DRUPE (*drūpa*), a stone fruit, *e.g.*, Plum.

DRUPA'CEOUS (*drūpāceus*), similar in appearance but differing in structure, *e.g.*, Walnut, Nutmeg.

BERRY* (*bacca*), a pulpy fruit, with seeds immersed in the pulp, *e.g.*, Gooseberry, Currant.

BAC'CATE (*baccatus*), having a berry like appearance, but differing in structure, *e.g.*, the fleshy "galbulus" of the Juniper, Belladonna, Buckthorn.

AGGREGATE—

CO'NE (*cōnus*), a conical compound fruit, consisting of woody scales, in the axils of which are naked seeds, *e g.*, Larch, Scotch Fir.

GAL'BULUS (*galbŭlus*), similar to a cone, but having the scales enlarged at the end, *e.g.*, Cypress.

STROB'ILE (*strŏbĭlus*), a short spike of fruits, hidden by large membranous bracts, *e.g.*, Hop.

SEED, *(Semen, n.)*

TES'TA (*testa*), the outer coat of the seed, *e.g.*, Bean.

ENDOPLEU'RA (*endopleura*), the inner coat of the seed, *e.g.*, Croton seed.

HI'LUM (*hilum*), the scar where the seed is attached to its stalk, or to the placenta, if sessile, *e.g.*, Calabar bean, Broad bean.

RAPH'E (*răphe*), a thread passing usually between the two coats of the seed, and connecting its apex with the funiculus or placenta, *e.g.*, orange pip, almond.

MI'CROPYLE (*mĭcrŏpylus*), the minute opening through which the radicle protrudes in germination, *e.g* , Bean Pea, Nux Vomica seed.

COTYLE'DONS (*cŏtylēdones*), the one or two lobes of the embryo, or seed-leaves, *e.g.*, Maize, Almond, Nux Vomica seed, Croton seed.

RAD'ICLE (*rādīcālis*), the minute root of the embryo, *e.g.*, Nux Vomica, Bean.

ALBU'MEN (*albūmen*), nutritive matter surrounding the seed.

CHALA'ZA (*chālāza*), the point at which the funiculus terminates in the seed, *e.g.*, Orange pip.

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* *In text-books this term is usually defined as belonging only to fruits which are inferior, but is often used in systematic botany in the wider sense given under "baccate."*

ORTHOT'ROPOUS (*orthotrŏpus*), having the chalaza at the base, and the micropyle at the apex of the seed, *e.g.*, Buckwheat.

CAMPYLOT'ROPOUS (*campylotrŏpus*), having the micropyle and radicle bent round to the base of the seed, the chalaza being near the hilum, *e.g.*, Bean.

ANAT'ROPOUS (*anătrŏpus*), having the micropyle at the base of the seed, and the chalaza at the top, connected with the hilum by a raphe, *e.g.*, Orange.

COTYLEDONS—

ACCUM'BENT (*accumbens*), having the radicle visible at the edge of the cotyledons, *e.g.*, Bean.

INCUM'BENT (*incumbens*), having the radicle visible at the back of one of the cotyledons, *e.g.*, Cress, Woad.

CONDU'PLICATE (*condŭplĭcătus*), having the radicle lying between the folded cotyledons, *e.g.*, Mustard seed.

STRAIGHT (*rectus*), having the plumule and radicle almost concealed within the base of the flat cotyledons, *e.g.*, Buckwheat.

ALBUMEN—

RU'MINATED (*rūmĭnătus*), having the endopleura folded into the albumen, *e.g.*, Nutmeg, Areca Nut.

FLESHY (*carnōsus*), *e.g.*, Bean.

HORNY (*cornĕus*), of very hard consistence, *e.g.*, Nux Vomica seed, Vegetable ivory "nut."

MEALY (*fărĭnăceus*), easily crushed to powder, *e.g.*, Buckwheat, Wheat.

OILY (*ŏlĕōsus*), yielding oil on pressure, *e.g.*, Castor oil seed, Star aniseed.

SCHEDULES.

These Schedules can be had separately of the Publishers, T. Christy & Co., London, in Books each containing one hundred. Price 1s.

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BRACTS.—Character, size, arrangement, colour.

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CARPELS.— Coherence, number, placentation, dehiscence, position and number of styles, number and shape of stigmas, character of fruit, seeds (few or many).

Remarks.

Name of Plant ____________________

ROOT.—Character, shape.

STEM.—Position, character, consistence, direction, shape, surface.

LEAVES.—Venation, position, division, shape, size, margin, consistence, surface, appendages.

STIPULES.—Character, shape, attachment.

INFLORESCENCE.—Character (centripetal or centrifugal), name.

BRACTS.—Character, size, arrangement, colour.

Root .... ____________________

Stem .... ____________________

Leaves .... ____________________

Stipules......... ____________________

Inflorescence... ____________________

Bracts .... ____________________

Sepals .... ____________________

Petals .... ____________________

Stamens ...... ____________________

Anthers.... .... ____________________

Carpels .... ____________________

Seeds .... ____________________

Class .... ____________________

Sub-class ...... ____________________

Natural Order ____________________

Place of Growth ____________ Date ____________

SEPALS.—Number, adherence, coherence, colour, persistence, æstivation, shape.

PETALS.—Number, coherence, shape, æstivation, persistence, colour.

STAMENS.—Number, position, arrangement, coherence, shape of filament, appendages.

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Root ....

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Inflorescence...

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Petals ....

Stamens ....

Anthers.... ....

Carpels ....

Seeds ....

Class ....

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Natural Order

Place of Growth ______________________ Date __________

SEPALS.—Number, adherence, coherence, colour, persistence, æstivation, shape.

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Leaves .... ______________________

Stipules......... ______________________

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Anthers.... .... ______________________

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Natural Order ______________________

Place of Growth ______________________ Date ______________

SEPALS.—Number, adherence, coherence, colour, persistence, æstivation, shape.

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Bracts .... ______________________________

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Seeds .... ______________________________

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Natural Order ______________________________

Place of Growth ______________________ Date ____________

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Inflorescence... ____________________

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Seeds .... ____________________

Class .... ____________________

Sub-class ...... ____________________

Natural Order ____________________

Place of Growth ____________ Date ____________

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Stipules......... ____________________

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Sepals .... ____________________

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Seeds .... ____________________

Class .... ____________________

Sub-class ...... ____________________

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Seeds .... ____________________

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Place of Growth ______________________ Date ____________

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Name of Plant

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Root ....

Stem ....

Leaves ....

Stipules.........

Inflorescence...

Bracts ....

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Petals ....

Stamens ......

Anthers.... ....

Carpels ....

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Class ....

Sub-class ......

Natural Order

Place of Growth____________________ Date __________

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Root	
Stem	
Leaves	
Stipules.........	
Inflorescence...	
Bracts	
Sepals	
Petals	
Stamens	
Anthers....	
Carpels	
Seeds	

Class	
Sub-class	
Natural Order	

Place of Growth ____________________ Date ____________

SEPALS.—Number, adherence, coherence, colour, persistence, æstivation, shape.

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Name of Plant

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LEAVES.—Venation, position, division, shape, size, margin, consistence, surface, appendages.

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Stem ....

Leaves ....

Stipules.........

Inflorescence...

Bracts ....

Sepals ....

Petals ....

Stamens ......

Anthers.... ....

Carpels ....

Seeds ....

Class ....

Sub-class ......

Natural Order

Place of Growth ____________ Date ____________

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Inflorescence...

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Sepals ....

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Anthers.........

Carpels ....

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Class ....

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Place of Growth ____________________ Date ____________

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Root .... ____________________

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Leaves .... ____________________

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Sub-class ...... ____________________

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Inflorescence... ______________________________

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Anthers......... ______________________________

Carpels .... ______________________________

Seeds .... ______________________________

Class .... ______________________________

Sub-class ...... ______________________________

Natural Order ______________________________

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Seeds .... ______________________

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Natural Order ______________________

Place of Growth ______________ Date ______________

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Anthers.... ....

Carpels ....

Seeds ....

Class ....

Sub-class ......

Natural Order

Place of Growth ______________ Date ______________

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Seeds .... ____________________

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Root	
Stem	
Leaves	
Stipules.........	
Inflorescence...	
Bracts	
Sepals	
Petals	
Stamens	
Anthers....	
Carpels	
Seeds	

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Sub-class	
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Root …………	
Stem …………	
Leaves ………	
Stipules………	
Inflorescence…	
Bracts ………	
Sepals ………	
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Anthers………	
Carpels ………	
Seeds …………	

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Sub-class ……	
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Inflorescence... ____________________

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Sepals .... ____________________

Petals .... ____________________

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STAMENS.—Number, position, arrangement, coherence, shape of filament, appendages.

ANTHER.—Position, coherence, number of cells, dehiscence, adherence, shape.

CARPELS.—Coherence, number, placentation, dehiscence, position and number of styles, number and shape of stigmas, character of fruit, seeds (few or many).

Remarks.

Name of Plant ______

ROOT.—Character, shape.

STEM.—Position, character, consistence, direction, shape, surface.

LEAVES.—Venation, position, division, shape, size, margin, consistence, surface, appendages.

STIPULES.—Character, shape, attachment.

INFLORESCENCE.—Character (centripetal or centrifugal), name.

BRACTS.—Character, size, arrangement, colour.

Root …………	
Stem …………	
Leaves ………	
Stipules………	
Inflorescence…	
Bracts ………	
Sepals ………	
Petals ………	
Stamens ……	
Anthers…. ….	
Carpels ………	
Seeds …………	

Class …………	
Sub-class ……	
Natural Order	

Place of Growth ______________________ Date ______________

SEPALS.—Number, adherence, coherence, colour, persistence, æstivation, shape.

PETALS.—Number, coherence, shape, æstivation, persistence, colour.

STAMENS.—Number, position, arrangement, coherence, shape of filament, appendages.

ANTHER.—Position, coherence, number of cells, dehiscence, adherence, shape.

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Root .... ____________________

Stem .... ____________________

Leaves .... ____________________

Stipules......... ____________________

Inflorescence... ____________________

Bracts .... ____________________

Sepals .... ____________________

Petals .... ____________________

Stamens ...... ____________________

Anthers.... .... ____________________

Carpels .... ____________________

Seeds .... ____________________

Class .... ____________________

Sub-class ...... ____________________

Natural Order ____________________

Place of Growth ____________________ Date __________

SEPALS.—Number, adherence, coherence, colour, persistence, æstivation, shape.

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Leaves .... ______________________________

Stipules......... ______________________________

Inflorescence... ______________________________

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Sepals .... ______________________________

Petals .... ______________________________

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Anthers.... .... ______________________________

Carpels .... ______________________________

Seeds .... ______________________________

Class .... ______________________________

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Natural Order ______________________________

Place of Growth ______________________ Date ______________

SEPALS.—Number, adherence, coherence, colour, persistence, æstivation, shape.

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Anthers.... ....

Carpels ....

Seeds ....

Class ....

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Natural Order

Place of Growth ____________________ Date ____________

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Leaves .... ____________________

Stipules......... ____________________

Inflorescence... ____________________

Bracts .... ____________________

Sepals .... ____________________

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Carpels .... ____________________

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Class .... ____________________

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Inflorescence...

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Anthers.........

Carpels ....

Seeds ....

Class ....

Sub-class ......

Natural Order

Place of Growth ______________ Date ______________

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Stem ....

Leaves ....

Stipules.........

Inflorescence...

Bracts ....

Sepals ....

Petals ....

Stamens ......

Anthers.........

Carpels ....

Seeds ....

Class ....

Sub-class ......

Natural Order

Place of Growth ________________ Date ____________

SEPALS.—Number, adherence, coherence, colour, persistence, æstivation, shape.

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Stem ....
Leaves ....
Stipules.........
Inflorescence...
Bracts ....
Sepals ....
Petals ....
Stamens ......
Anthers.... ....
Carpels ....
Seeds ....

Class ....
Sub-class ......
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Stem .... ____________________

Leaves .... ____________________

Stipules......... ____________________

Inflorescence... ____________________

Bracts .... ____________________

Sepals .... ____________________

Petals .... ____________________

Stamens ...... ____________________

Anthers.... .... ____________________

Carpels .... ____________________

Seeds .... ____________________

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Sub-class ...... ____________________

Natural Order ____________________

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Leaves .... ____________________

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Carpels .... ____________________

Seeds .... ____________________

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Sub-class ...... ____________________

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Root	
Stem	
Leaves	
Stipules.........	
Inflorescence...	
Bracts	
Sepals	
Petals	
Stamens	
Anthers....	
Carpels	
Seeds	

Class	
Sub-class	
Natural Order	

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Stem ....

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Inflorescence...

Bracts ....

Sepals ....

Petals ....

Stamens ......

Anthers.........

Carpels ....

Seeds ....

Class ....

Sub-class ......

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Seeds .... ____________________

Class .... ____________________

Sub-class ...... ____________________

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Root	
Stem	
Leaves	
Stipules.........	
Inflorescence...	
Bracts	
Sepals	
Petals	
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Anthers....	
Carpels	
Seeds	

Class	
Sub-class	
Natural Order	

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Bracts	
Sepals	
Petals	
Stamens	
Anthers....	
Carpels	
Seeds	

Class	
Sub-class	
Natural Order	

Place of Growth ______________________ Date ______________

SEPALS.—Number, adherence, coherence, colour, persistence, æstivation, shape.

PETALS.—Number, coherence, shape, æstivation, persistence, colour.

STAMENS.—Number, position, arrangement, coherence, shape of filament, appendages.

ANTHER.—Position, coherence, number of cells, dehiscence, adherence, shape.

CARPELS.—Coherence, number, placentation, dehiscence, position and number of styles, number and shape of stigmas, character of fruit, seeds (few or many).

Remarks.

Name of Plant ______________________

ROOT.—Character, shape.

STEM.—Position, character, consistence, direction, shape, surface.

LEAVES.—Venation, position, division, shape, size, margin, consistence, surface, appendages.

STIPULES.—Character, shape, attachment.

INFLORESCENCE.—Character (centripetal or centrifugal), name.

BRACTS.—Character, size, arrangement, colour.

Root	
Stem	
Leaves	
Stipules.........	
Inflorescence...	
Bracts	
Sepals	
Petals	
Stamens	
Anthers.........	
Carpels	
Seeds	

Class	
Sub-class	
Natural Order	

Place of Growth____________________ Date __________

SEPALS.—Number, adherence, coherence, colour, persistence, æstivation, shape.

PETALS.—Number, coherence, shape, æstivation, persistence, colour.

STAMENS.—Number, position, arrangement, coherence, shape of filament, appendages.

ANTHER.—Position, coherence, number of cells, dehiscence, adherence, shape.

CARPELS.—Coherence, number, placentation, dehiscence, position and number of styles, number and shape of stigmas, character of fruit, seeds (few or many).

Remarks.

INDEX TO SCHEDULES.

NAME OF PLANT.	PAGE.

INDEX TO SCHEDULES.

NAME OF PLANT.	PAGE

Chart I.—VEGETABLE

SUB-KINGDOMS.

Phanerogamia.—Plants bearing flowers (1) *; leaves with the smaller veins

CLASSES.

I.—Dicotyledons (2).—Parts of flower 4-5; Leaves net-veined.

SUB-CLASSES.

THALAMIFLORÆ (4)*.

Petals distinct from each other
Pet. and stam. on thalamus

Ranunculaceæ (7).

Stamens numerous
Carpels distinct

Papaveraceæ (8).

Stamens numerous
Carpels united
Sepals 2, caducous

Malvaceæ (9).

Stamens monadelphous
Anthers reniform, one-celled

Cruciferæ (10).

Stamens tetradynamous
Petals 4, clawed

Caryophyllaceæ (11).

Petals 5, clawed
Leaves, opp., entire
Stamens 4-10
Placenta free central

Rutaceæ.

Leaves dotted
Stamens 5-10
Carpels united half-way, situated on a disk

Violaceæ.

Corolla, spurred, irregular
Ovary 1-celled
Anthers 5, appendaged
Leaves stipulate

CALYCIFLORÆ.

Petals distinct from each other†
Petals and stamens on calyx

Rosaceæ (12).

Stamens numerous
Flowers regular
Calyx persistent

Leguminosæ (13).

Corolla papilionaceous rarely regular
Fruit a legume

Umbelliferæ (14).

Flowers in umbels
Fruit a cremocarp
Stamens 5; styles 2

Cucurbitaceæ.

Flowers unisexual
Anthers sinuous

COROLLIFLORÆ (40).

Petals united

Compositæ (15).

Flowers in capitula
Anthers syngenesious

Scrophulariaceæ (16).

Flowers irregular
Stamens didynamous or 2
Ovary 2-celled, many-seeded
Placentæ axile

Labiatæ (17).

Like the last, but ovary 4-lobed, with one seed in each lobe

Boraginaceæ (18).

Corolla regular, with 5 scales in the throat
Ovary as in Labiatæ
Leaves alternate, rough
Infl. a scorpioid cyme

Solanaceæ (19).

Æstivation valvate
Infl. extra axillary
Ovary 2-celled
Placentæ axile
Corolla regular

Atropaceæ (20).

Æstivation imbricate
Anthers never with porous dehiscence
Otherwise like Solanaceæ

Gentianaceæ (21).

Leaves opposite, entire, smooth
Corolla marcescent
Placentæ 2, parietal

Convolvulaceæ (22).

Plants twining
Corolla funnel-shaped, plaited, striped
Seeds few, large

Primulaceæ (59).

Stamens opp. petals
Stigma 1
Placenta free central

MONOCHLAMYDEÆ (5)

Only one row of leaves in the flower
Flowers unisexual when stamens are numerous

Polygonaceæ (23).

Stipules ochreate
Fruit 1-seeded usually triangular

Euphorbiaceæ (24).

Flowers unisexual, small, green
Ovary 3-celled, each cell one-seeded
Juice milky

Amentiferæ (25).

Staminate flowers always, & pistillate flowers often in catkins
Includes Salicaceæ, Betulaceæ, Myricaceæ, and Corylaceæ (see Chart II).

Coniferæ (64).

L. linear
Staminate catkins small
Anthers 1-celled
Fruit a cone or galbulus

Taxaceæ.

L. linear in 2 rows
Anthers 3-8-celled
Fruit succulent
Ovule 1, naked

Cycadaceæ.

(Not British.)

Leaves terminal, pinnate
Stem unbranched
Catkins terminal
Plants diœcious

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* *All these numbers refer to the Appendix, p. 164, &c.*

† *Except in Cucurbitaceæ.*

KINGDOM.

parallel or forming a network.		II.—Cryptogamia.—Flowerless plants; Leaves, when present, with forked or simple veins.	
II.—Monocotyledons (3)—Parts 3-6; Leaves usually parallel-veined.		III.—Acotyledons.	
PETALOIDÆ (6). Perianth 3-6-parted, coloured. Leaves parallel veined	**GLUMIFERÆ.** Perianth usually 2-parted, enclosed in chaffy bracts Leaves parallel-veined	**ACROGENÆ.** Stem distinct Leaves with forked or simple veins, or none	**THALLOGENÆ.** No true leaves, plant consisting of a more or less branched cellular expansion or thallus
Orchidaceæ (26). Flowers irregular Stamens gynandrous Ovary 1-celled, inferior **Iridaceæ** (27). Leaves equitant Stamens 3 Anthers extrorse Ovary inferior **Amaryllidaceæ.** Ovary inferior Stamens 6 **Liliaceæ** (28). Ovary superior Stamens 6 Style entire **Melanthaceæ** (29). Ovary superior Stamens 6 Anthers extrorse Style split	**Graminaceæ** (30). Stem round, jointed Leaves with split sheaths Anthers notched at both ends **Cyperaceæ** (31). Stems mostly angular, few jointed Leaves with tubular sheaths Anthers entire at apex	**Filices** (32). Leaves with forked veins Spore cases in groups at back or margins of leaf or modified leaf; spores not appendaged **Equisetaceæ.** Stems of separable joints, leafless, with toothed scales Spore cases in terminal heads Spores with 4 elaters attached to them **Marsileaceæ** (33). Leaves sessile or stalked and forked veined Spore cases at base of leaves **Lycopodiaceæ.** Stems woody, with scale-like leaves Spore cases many, in terminal leafy spikes Spores of two sizes, angular **Musci.** Stems herbaceous Leaves minute, scale-like Spore cases lateral or terminal, usually solitary and stalked Spores without elaters **Hepaticæ** (34). Stems & leaves as last Spore cases splitting longitudinally, mostly on hyaline stalks Spores mixed with loose elaters	**Lichenes.** Cellular plants, growing on trees or rocks, containing chlorophyll and often starch **Fungi.** Cellular, mostly of short duration and living on decaying matter, contain no chlorophyll nor starch; nourished by a mycelium **Algæ.** Growing in water or damp places; contain chlorophyll or colouring matter, and often starch **Characeæ.** Immersed in water, with peculiar reproductive organs (nucules and globules) Stems with whorled branches.

DIRECTIONS FOR USING THE CHARTS.

In procuring specimens for examination, wild plants with well developed flowers should be chosen by the beginner, since they are less liable to variation than cultivated flowers. If only the latter can be had, they should first be carefully examined (if possible by some one having a knowledge of Botany), to see if the normal number of parts are present in the flower, for many garden flowers become more or less double under cultivation, or vary considerably in the number of parts in different blossoms on the same plant. Thus the tulip and hyacinth will often have seven or eight parts in the perianth, although the normal number is six, and the Chinese primrose six parts instead of five ; or, the stamens may be partly turned into petals as in the Azalea and Pyrus Japonica. In such cases, however, the blossoms that first open are more frequently abnormal, those which open afterwards being usually normal.

Wild plants, however, rarely vary in this way ; any exceptional plants or groups will be pointed out as far as possible in the appendix. The plant having been ascertained to be normal, the student should proceed as follows :—

Examine the number of sepals (outer row of leaves in the flower) and of petals (inner row of leaves in the flower). If these parts are in rows of four or five in number, look at the leaves or the stem, and if the small veins form a network, or the stem presents one or more rings of woody tissue, the plant is a..DICOTYLEDON.

If the parts of the flower are in rows of three or six parts, and the smaller veins of the leaves on the stem are arranged in a parallel manner, the plant is a.........MONOCOTYLEDON.

If the plant be a Dicotyledon,—

See whether a row of petals (corolla), as well as a row of sepals (calyx), is present. When the sepals are similar in colour to the petals, they are easily distinguished by looking at the back of the flower, when they will be seen to be alternate with, and to overlap the petals. If only sepals are found, and the stamens (thread-like bodies, bearing powdery heads or anthers) are few, with a seed-vessel (pistil) in their midst; or, numerous without a seed-vessel, the plant belongs to the sub-class ....**MONOCHLAMYDEÆ.**

If petals and sepals are both present, and the petals are more or less united together, so as to come off in one piece, the plant belongs to the sub-class............**COROLLIFLORÆ.**

If the petals are quite separate from each other, it belongs either to the Calyciflorœ or to the Thalamiflorœ. Observe if the stamens are attached to any part of the calyx, or to the top of the flower-stalk just underneath the pistil. This is best ascertained by pulling off the sepals close to the flower-stalk, and if the stamens are attached to the sepals they will come off with them. If the flower be small, the position of the stamens is most easily seen by cutting the flower in half longitudinally with a sharp knife. If the stamens are seen to be attached to the calyx, the plant must belong to the sub-class...**CALYCIFLORÆ.***

If the stamens are attached to the thalamus just beneath the ovary, it belongs to the sub-class, **THALAMIFLORÆ.**

If the plant be a Monocotyledon,—

Observe whether the leaves have the small veins arranged in a network; if so, it belongs to the ....**DICTYOGENÆ.**

If the leaves have parallel veins, and the leaves of the flower (perianth) are in threes or sixes, the plant belongs to the...**PETALOIDEÆ.**

If the stamens and pistil are enclosed between two membranous bracts, and the leaves are narrow with evident sheaths, it belongs to...**GLUMIFERÆ.**

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* In some cases, as in the papilionaceous flowers, it is not easy to ascertain whether the stamens are on the thalamus or on the calyx; in such cases, if the stamens cannot be directly traced to the thalamus, with the aid of a lens, it may be concluded that the plant belongs to the Calycifloræ.

To refer a plant to its natural order, compare the plant with the character given under each of the families in the sub-class to which it belongs, thus if it belongs to Thalamifloræ, see (1) if the stamens are numerous, and the carpels distinct; (2) if not, see if the stamens are numerous, and carpels united, the sepals being two; (3) if not, pass on to the next family, until one is met with which agrees with the plant examined.

Thus, supposing the plant under examination has six stamens, of which four are long and two short, and four distinct petals, it evidently does not answer to the characters given under Ranunculaceæ, nor to those of Papaveraceæ, both of which have numerous stamens, *i.e.*, more than 20 in number, nor to Malvaceæ, for that has numerous stamens united into a tube (monadelphous); but, it does agree with the characters given under Cruciferæ, to which it accordingly belongs.

If the specimen be a British plant and does not agree with any of the families in the first chart, the notes in the appendix should be referred to, and if the exceptions there mentioned do not throw any light upon the difficulty, chart No. 2 should be tried. If the plant cannot then be identified with any description in that chart, the student has probably made an error in observation, and should get the mistake pointed out to him by some practical botanist.

If the student, after having discovered the natural order, desires to find out the name of any British wild plant, the best book for his purpose is the "Botanist Pocket Book," by W. R. Hayward. This little work is of a convenient size for the pocket, and gives as briefly as possible, all that is necessary to easily trace out the plant.

Appendix to Chart I.

The student should endeavour to obtain and examine all the plants mentioned in this Appendix as they come into blossom ; for when the exceptions in each family are known, it is much easier to apply the rules laid down in the charts for tracing a plant to its order. To find out their time of flowering the Floral Kalendar may be referred to. (See p. 180.)

1.—**PHANEROGAMIA.**—All plants having leaves with the smaller veins parallel or reticulated, bear flowers at some period of their existence. A few exotic ferns which have reticulated venation may be known to be Acrogens by taking a transverse section of the leaf-stalk, which will show the arrangement of the woody bundles characteristic of Acrogens.

2.—**DICOTYLEDONS.**—In the following Dicotyledonous plants the parts of the flower are often 3 to 6. The rule of 4 or 5 parts to the flower will apply to all other British dicotyledons.

Berberis vulgaris	known by	its sensitive stamens and valvate anthers.
Reseda	,,	the likeness to Mignonette.
Polygala	,,	the 8 stamens.
Elatine hexandra	,,	the opposite leaves and likeness to the Caryophyllaceæ.
Impatiens	,,	the 5 stamens.
Peplis portula	,,	its opposite leaves and 12-toothed calyx.
Rumex	,,	the ocreate stipules.
Empetrum	,,	its heathlike habit.
Amaranthus Blitum	,,	its chaffy bracts and net-veined leaves.
Aristolochia	,,	its six-celled capsule and gynandrous stamens.
Asarum europæum	known by	the anthers attached apparently to the middle of the filaments.

All the above have also a dicotyledonous embryo, and may also be known by their exogenous stem and reticulated leaves.

Some Acacias (Leguminosæ) and other dicotyledonous plants have phyllodes (see note 13) instead of leaves, in which the veins appear to be parallel. These phyllodes may be known to be such by being set edgewise on the stem, and by the smaller veins forming an indistinct network.

3.—**MONOCOTYLEDONS.**—In a few Monocotyledonous orders, viz., Dioscoraceæ, Smilaceæ, Trilliaceæ, Roxburghiaceæ, and Philesiaceæ, the leaves are net-veined. By some botanists these are formed into a separate group, called Dictyogenæ; those who do not adopt this plan generally arrange all those families in which a spadix is the characteristic inflorescence into a separate group, called Spadicifloræ (see note 68). There are only two British plants belonging to the Dictyogenæ, viz., Tamus and Paris. In Chart II, the Spadicifloræ are grouped together under Petaloideæ.

4.—**THALAMIFLORÆ.**—In the garden Nasturtium (Tropœolum) two of the petals are attached to the spur of the calyx. In Eschscholtzia the thalamus is dilated into a hollow cup to which the calyptrate calyx is attached, and the stamens are slightly attached to the petals. In the Mallow, in the single Camellia, and in the Orange blossom, the stamens form a tube to which the petals are attached, although they are distinct from each other; this may be readily seen by examining the outside of the corolla. In Polygala the petals are united, but the affinities of the genus are all Thalamifloral.

Pyrola and Monotropa (Corollifloræ) have distinct petals, but are so nearly allied to the Ericaceæ, that the one is placed in, and the other near that order.

5.—**MONOCHLAMYDEÆ.**—In the following plants, which do not belong to this sub-class, a calyx only is present.

Thalamifloræ	Caltha, Anemone, Clematis, Thalictrum, Sagina apetala, Scleranthus, and Cherleria.
Calycifloræ	Sanguisorba, Alchemilla, Poterium, Sibbaldia, Rhamnus, Isnardia, Hippuris, Chrysosplenium.
Corollifloræ	Fraxinus excelsior, Glaux maritima, Peplis Portula.

In the Ranunculaceous plants, the numerous stamens and distinct carpels in the *same* flower distinguish them from the

Monochlamydeæ ; all the families with numerous stamens in that sub-class having unisexual flowers. It will be well for the student to obtain specimens of the remainder when possible, for examination, and compare them with other members of the families to which they belong. Buxus and Empetrum have petals.

6.—**PETALOIDEÆ.**— This sub-class corresponds to the Florideæ of some authors. In Chart II, it includes the Spadicifloræ of some botanists. In the Araceæ and in some orchids, the leaves are net-veined ; in Tradescantia Virginica, the sepals are green ; in Juncaceæ, the whole of the perianth is green, and somewhat chaffy in substance. The Juncaceæ are known from the grasses and sedges, which they resemble in foliage, by having six stamens on each flower and a six-parted perianth. For a list of plants with six parts to the flower, which do *not* belong to Petaloideæ, see note 2.

7.—**RANUNCULACEÆ.**—In Myosurus minimus (an uncommon plant) there are only five stamens ; and in Nigella (a garden plant) the carpels are united. In Anemone, Clematis, Thalictrum, Caltha, and Hepatica, the corolla is absent. In Hepatica, what appears to be a calyx is an involucre of three bracts, which will be seen to be attached *below* the thalamus. Clematis is the only genus with opposite leaves in this family. Actæa spicata has a single fleshy carpel, and Trollius has numerous sepals. In Helleborus and Eranthis the petals are tubular. In Aconitum and Delphinium both calyx and corolla are irregular. In Ranunculus Flammula the leaves are not radiate-veined.

Clematis –
calyx valv
Anemone –
calyx color
3 bracts
Helleborus
ft follic
[illegible]
Acta

Other natural orders which have flowers bearing some resemblance to those of Ranunculaceæ, are Hypericaceæ, which differ in having dotted opposite leaves and united carpels, and Rosaceæ, in the genus Potentilla, which has the stamens attached to the *persistent calyx.* In all British Ranunculaceæ, in which the fruit consists of achenes, the calyx is *deciduous*, and the stamens are attached to the thalamus.

8.—**PAPAVERACEÆ.**—In Glaucium luteum, Chelidonium majus, and Eschscholtzia, the capsule is long and podlike, and in the last, the stamens are adherent to the petals, which arise from a cup-shaped thalamus. In Eschscholtzia, the two sepals remain united in the form of an extinguisher when the flower expands. In Papaver bracteatum the sepals are sometimes three in number, which is apparently due to the splitting of one of the sepals during its growth. The only family with flowers much resembling those of the Papaveraceæ is the Cistaceæ, in which the sepals are persistent and five in number, and the leaves simple and often opposite.

9.—**MALVACEÆ.**—In all British plants of this order, the fruit is a carcerule; but in some exotics, as the cotton plant and Abelmoschus, it becomes a capsule dehiscing loculicidally. The one-celled anthers distinguish this natural order from all others nearly allied to it.

10.—**CRUCIFERÆ.**—In the Radish (Raphanus) the siliqua is indehiscent, and the replum abnormally developed. In the Woad (Isatis tinctoria), the siliqua is one-seeded, and the replum not developed. In Senebiera the stamens are only two, and are not always six in number in some species of Lepidium and Capsella. In the Wallflower the stamens are nearly equal in length.

11.—**CARYOPHYLLACEÆ.**—In Lychnis diurna the flower becomes diœcious by the abortion of one sex, only traces of stamens being found in the pistillate, and of pistils in the staminate plants.

In Silene and Lychnis the ovary is sometimes from three to five-celled, and the placentation is in consequence axillary. In Cucubalus (a rare plant) the fruit is baccate. In the following British plants of this order the corolla is absent:—Sagina apetala, Cherleria sedoides, and Scleranthus annuus (see Note 50). Linum catharticum and Radiola millegrana in the Linaceæ (see Chart II) have the habit of the Caryophyllaceæ, but the twisted æstivation of the corolla and the many-celled fruit will at once distinguish them. (See Note 50).

12.—**ROSACEÆ.**—In Sibbaldia the stamens are only five in number, and from one to four in Alchemilla and Sanguisorba.

In Poterium the flowers are monœcious or polygamous ; and in Sanguisorba, Poterium, and Alchemilla, the petals are absent (see Note 7). The "double" form of the Cherry blossom shews the carpel and seed converted into leaves ; the " Rose verte," illustrates well the leafy nature of the petals.

The Saxifragaceæ differ from this family in having only from five to ten stamens, in the absence of stipules, and in the ovary being composed of only two many-seeded carpels united half-way.

13.—**LEGUMINOSÆ.**—In the sub-orders Cæsalpineæ and Mimoseæ, neither of which are indigenous in Britain, the flowers are not papilionaceous. In the Cæsalpineæ the flower has an open appearance, owing to the wings of the corolla, which are larger than usual, overlapping the standard ; in Mimoseæ the calyx and corolla are regular, and very minute in most of the plants cultivated in hothouses in this country. In the latter sub-order phyllodes frequently replace leaves ; these are well seen in Acacia armata and A. longifolia. In Cassia Fistula, the legume is indehiscent and lomentaceous, and the seeds are albuminous. The only family having flowers resembling those of the Papilionaceæ is the Polygalaceæ, in which the apparent wings of the corolla are really sepals. Polygala fruticosa is a suitable species for examination.

14.—**UMBELLIFERÆ.**—In Eryngium and Sanicula the inflorescence resembles a capitulum rather than an umbel. These plants are however easily distinguished from the Compositæ by the distinct anthers and by the structure of the fruit (see cremocarp). In several species of Bupleurum, the leaves are entire, and the umbels are small and almost concealed by the involucre. In Carum Carui adnate stipules are present. In Scandix Pecten-Veneris the cremocarps are enormously elongated. In Hydrocotyle the umbels are minute, sessile, and few-flowered, and the fruit does not split. In Œnanthe crocata the teeth of the calyx are well marked.

15.—**COMPOSITÆ.**—The leaves are alternate in all British plants except Bidens. The florets of the ray are absent in several genera belonging to the sub-order Corymbiferæ, such as Eupatorium, Petasites, Linosyris, Gnaphalium, and some species of Senecio. Pappus is absent in the following medicinal plants :—Artemisia Absinthium, Anthemis nobilis, Matricaria Chamomilla, and Tanacetum vulgare. In Xanthium the capitulum is unisexual, and the bracts of the pistillate capitulum are united so as to entirely enclose the florets. In Serratula the capitula are diœcious by abortion. The British sub-orders are thus distinguished :—

Corymbiferæ	florets of the disk, tubular ; florets of the ray often ligulate ; style not swollen below the stigma.
Cynarocephalæ	florets all tubular; style swollen below the stigma.
Cichoriaceæ	florets all ligulate and perfect.

In Jasione montana, a flower belonging to the Campanulaceæ, the anthers are united at the base, but the florets are stalked, and the fruit two-celled. In other respects, the flower might be mistaken for one of the Compositæ.

16.—**SCROPHULARIACEÆ.**—In Verbascum the stamens are five in number, and the corolla only slightly irregular. In Pentstemon (a garden plant) there are also five stamens, but one of the filaments is barren. In Scrophularia a scale (staminode) occupies the place of a fifth stamen. In Veronica and Calceolaria the stamens are two in number. In Limosella and Sibthorpia (both rather local and rare) the flowers are minute, and in the former the placentæ are free-central, and the corolla is regular.

17.—**LABIATÆ.**—In Salvia the anthers are distractile. (See p. 30). In this genus, as well as in Lycopus and Rosmarinus, the stamens are two only. The leaves are always opposite in this family.

18.—**BORAGINACEÆ.**—In Echium vulgare and E. violaceum the corolla is somewhat irregular, but the rough alternate leaves and five stamens well distinguish them from the Labiatæ, which they resemble in the structure of the ovary.

19.— **SOLANACEÆ.** —In Cestrum the inflorescence is terminal. The regular flowers and five stamens distinguish this family from the Scrophulariaceæ, to which they are otherwise nearly allied.

20.—**ATROPACEÆ.**—The inflorescence in this family is often only apparently axillary, the flower-buds appearing at the side of the leaf-buds. In Atropa Belladonna the first leaf of the leaf-buds is nearly equal in size to the leaf from whose axil it springs, giving an appearance as if the leaves grew in pairs (geminate).

21.—**GENTIANACEÆ.**—In Menyanthes trifoliata the leaves are compound, and apparently alternate, and as in Villarsia they are radical. In Erythræa the ovary is nearly two-celled, from the infolding of the edges of the carpels.

22.—**CONVOLVULACEÆ.**—In Cuscuta, which is sometimes placed in a separate order, there are no leaves, and the corolla is small and bell-shaped. See Cuscutaceæ, Chart II.

23.—**POLYGONACEÆ.**—In Rumex all the parts of the flower are in threes, and in Oxyria the stamens are six. All the plants of this family are, however, easily recognised by the ocreate stipules and one-celled, one-seeded fruit. In Rumex acetosa and R. Acetosella the flowers are diœcious.

24.—**EUPHORBIACEÆ.**—In Buxus and Mercurialis the juice is watery and the leaves are opposite. In Mercurialis the capsule is two-celled, and in Buxus there are three minute petals in the pistillate flower, and two in the staminate one. In Ricinus communis the stamens are polyadelphous. Many foreign plants of this order have succulent leafless stems, like those of the Cactaceæ, but are easily distinguished from them by yielding a milky juice when punctured. In Euphorbia jacquinæflora the involucre is of a scarlet colour and looks like a calyx. In Poinsettia the filaments of the stamens are scarlet and their pedicels white.

25.—**AMENTIFERÆ.**—Some botanists separate, and others unite, the various groups of catkin-bearing plants (See Chart II). The natural order Corylaceæ is sometimes called Cupuliferæ, from the ovary being enclosed in a cupule.

26.—**ORCHIDACEÆ.** — In Cypripedium there are two anthers, one on each side of the style. Neottia Nidus-avis is of brownish hue and leafless. In Orchis maculata the stalked pestle-shaped pollen masses are easily seen, and in Cephalanthera the lozenge-shaped form of the pollen masses may be observed, while the style forms a distinct column in the centre of the flower.

27.—**IRIDACEÆ.**—Two plants belonging to the Melanthaceæ, Bulbocodium vernum and Colchicum autumnale, bear much resemblance to a purple crocus, but differ in having six stamens and a superior ovary. In Crocus and Trichonema the leaves are not equitant (see Note 69).

28.—**LILIACEÆ.**—In Ornithogalum umbellatum the style is three-cleft, but the anthers are introrse. The anther should be examined for this character soon after it has burst open. Asparagus, Convallaria, Polygonatum, Maianthemum, and Ruscus have baccate fruits, and, on this account, are by some botanists placed in a separate order called Asparagaceæ. The true leaves in Ruscus are minute scales at the base of the phylloid peduncles, which latter look like leaves, but have a flower-bud in their centre, subtended by a minute awl-shaped bract. In Allium some of the flower-buds occasionally develope in the form of bulbs.

29.—**MELANTHACEÆ.**—This family is sometimes called Colchicaceæ.

30.—**GRAMINACEÆ.**—The British plants of this family are usually distinguishable at sight from most of the Cyperaceæ by having spikelets uniform in appearance and consisting of flowers which are each enclosed between two bracts; while in Cyperaceæ the staminate flowers are in the majority of plants arranged in the terminal spikelet, which, on this account, differs in appearance from the others (see Note 31). In Phragmites and Calamagrostis the flowers are furnished with tufts of hairs at their base.

31.—**CYPERACEÆ.**—In Eleocharis and Scirpus the stems are round, and are furnished with leaf-sheaths, which are entire but leafless or nearly so. In Graminaceæ the two empty bracts at the base of each spikelet are called glumes; but in Cyperaceæ it is the bracts underneath each flower that are called glumes, and which are often three or more in number, instead of two as in the Graminaceæ, in which family they are called paleæ. In Carex the ovary is enclosed in a tubular perianth, which is usually two-toothed at the apex, and may be regarded as equivalent to the paleæ in grasses. This perianth is replaced by bristles or hairs in several genera of the Cyperaceæ; these are well developed in the Cotton "grass" (Eriophorum). Those Cyperaceæ which have round stems, may be distinguished from the Juncaceæ by the flowers not having a regular six-parted perianth, but being always enclosed in, or overlapped by, imbricated bracts.

32.—**FILICES.**—In a few foreign ferns the veins of the fronds unite, so as to give an apparently reticulated appearance, which, however, when once seen is easily recognised as different from that of exogenous plants; from which also the sori, when present, distinguish them.

33.—**MARSILEACEÆ.**—Some Marsileas have leaves very like those of Oxalis or Trifolium, but they may be distinguished by having forked veins.

34.—**HEPATICÆ.** — In Anthoceros the elaters (spiral threads) are imperfect, and in Ricciaceæ they are altogether wanting. In Targionia the capsule is sessile, and in Ricciaceæ it is imbedded in the frond. Among the Musci the genus Andræa has capsules splitting longitudinally, but the valves remain united at the apex, the spores have no elaters mixed with them, and the fruit-stalk is not transparent.

Appendix to Chart II.

35.—**CISTACEÆ.**—The persistent calyx, and simple style and stigma, and the frequently opposite leaves, distinguish this family from the Papaveraceæ.

36.—**HYPERICACEÆ.**—The three- or several-celled ovary, and the stamens united at the base into three or more bundles, as well as the versatile anthers, distinguish these plants from the Ranunculaceæ.

37.—**TILIACEÆ.**—The three trees which represent this family in Britain are easily recognised, when in blossom, by their corymb of small greenish flowers, the main stalk of the corymb being adherent for some distance to a membranous bract. The two-celled anthers distinguish exotic plants of this family from the Malvaceæ.

38.—**BERBERIDACEÆ.**—Berberis vulgaris has the sepals, petals, and stamens, six in number, but the valvular dehiscence of the anthers marks out this family from all others in the Thalamifloræ. In Berberis vulgaris the stamens are sensitive to the touch. In Epimedium alpinum, the parts of the flower are in fours, and the petals form horn-shaped nectaries.

39.—**LINACEÆ.**—Radiola millegrana and Linum catharticum have very small white flowers and opposite leaves (see Note 11).

40.—**POLYGALACÆ.**—The two inner sepals are larger than the other three, and usually resemble petals. The petals are usually connected together. The affinities of the family are, however, thalamifloral.

41.—**ELATINACÆ.**—In Elatine hexandra the stamens are six and the petals three in number. The two British species are rare aquatic plants. Montia fontana, which also grows in water, and belongs to the Portulacaceæ, in the Calycifloræ, has only two sepals and no stipules. Peplis Portula, also similar in habit, has a monosepalous calyx with twelve teeth (see Note 43).

42.—**RESEDACÆ.**—All the plants of this family have flowers very similar in appearance to mignonette.

43.—**LYTHRACEÆ.**—Lythrum Salicaria has the habit of a labiate plant, but the fact of the petals being distinct at once distinguishes it. In Peplis Portula, the calyx is vase-shaped, and the petals are often wanting; the stamens and petals are both six in number, and the calyx has six subulate and six broader teeth.

44.—**SAXIFRAGACEÆ.**—In Chrysosplenium the corolla is absent. Parnassia palustris (a plant of the Eastern Counties), which is sometimes placed in Droseraceæ, has four sessile stigmas, and a one-celled capsule. For Adoxa Moschatellina (see Note 47).

45.—**ONAGRACEÆ.**— Isnardia palustris (an exceedingly rare plant in Britain) has no petals. It much resembles Peplis Portula in habit and size, but the calyx is only four-toothed, the flower has only four stamens, and the capsule is quadrangular.

46.—**CORNACÆ.**—The simple style and solitary seed distinguish this family from the Umbelliferæ. In Cornus suecica (a small alpine plant) the small umbel of flowers is enclosed in four large petaloid bracts.

47.—**ARALIACEÆ.**—Adoxa Moschatellina is sometimes placed in this family, and sometimes in Saxifragaceæ. It is easily recognised by the small green flowers forming a little terminal head, consisting of four flowers, surmounted by a fifth which is usually four-parted, all the others being five-parted.

48.—**RHAMNACEÆ.**—In Rhamnus catharticus the flowers are diœcious and the petals are absent.

49.—**RIBESIACEÆ.**—This family is also called Grossulariaceæ. The petals are usually much smaller than the sepals and of the same colour, and require careful examination to discover them.

Chart II.—BRITISH NATURAL ORDERS.

THALAMIFLORÆ.

Stamens numerous.

Nymphæaceæ.
Aquatic plants
Stigmas radiate
Sepals and stam., petaloid

Cistaceæ (35).
Leaves, entire, simple
Petals crumpled in bud
Sep. 5, with 2 outer, smaller, persistent
Style and stigma 1

Hypericaceæ (36).
L opposite, dotted
Styles 3 to 5
Petals yellow, twisted in bud

Tiliaceæ (37)
Trees; Leaves oblique
Peduncle springing from a leafy bract
Style 1

Stamens less than 20 in number, more or less united at their base.

Berberidaceæ (38).
Anthers valvate
Stam. 4 to 8, opposite petals
Carpel 1

Geraniaceæ.
Leaves stipulate
Stigmas 5
Fruit with a long beak and 5 carpels
Corolla nearly regular

Linaceæ (39).
Leaves simple entire
Stam. 5, with alternate teeth (abortive stamens)

Oxalidaceæ.
L. ternate
Stam. 10 in 2 rows, inner row longest

CALYCIFLORÆ.

Ovary superior.

Lythraceæ (43).
Style 1, filiform
Calyx tubular
Ovary free from calyx
Seeds many

Ovary half inferior.

Crassulaceæ.
Leaves fleshy
Carpels nearly distinct
Styles 3 or more
Ovary nearly superior

Saxifragaceæ (44).
Carpels 2, united below
Styles 2
Stamens 5-10
Ovary nearly superior

Ovary quite inferior.

Onagraceæ (45).
Parts of flower 2, 4, 8
Petals convolute in bud

Cornaceæ (46).
Shrubs or wiry plants
Parts of flowers in 4
Pet. valvate in bud

Araliaceæ (47).
Fl. in umbels
Fruit 3 or more celled
Fruit a cremocarp

COROLLIFLORÆ.

Ovary inferior; stamens epigynous.

Dipsacaceæ.
Flowers in capitula; anthers distinct
Leaves opposite

Lobeliaceæ.
Flowers irregular
Anthers united
Stigma hairy; seeds many

Campanulaceæ (52).
Flowers regular
Style 1, hairy; stigmas 2-5
Stamens dilated at base

Valerianaceæ (53).
L. opposite
Fl. small, irregular
Stam. 1-3. Infl. cymose

Rubiaceæ (54).
Leaves whorled
Cor. small, regular
Ovary 2-seeded

Caprifoliaceæ (55).
Shrubs
L. opposite, exstipulate
Stigmas 3, or 1 capitate

Loranthaceæ.
Parasitical shrubs
Leaves opposite
Stam. 4, opposite the petals

Ovary superior; Fl. irregular; Stamens 2-4

Orobanchaceæ (56).
Root parasites, with pale scaly stems without leaves
Stam. didynamous
Placentas parietal

Lentibulariaceæ (57).
Bog or aquatic plants
Cor. irregular spurred
Stam. 2; plac. free-central

Verbenaceæ.
Like Labiatæ, but the ovary not divided in 4
Style terminal; seeds 4

MONOCHLAMYDEÆ.

Calyx evident; Fl. not in catkins

Thymelaceæ (63).
Shrubs
Leaves smooth
Stam. 8 in 2 rows

Ulmaceæ.
Trees
L. rough, oblique
Fl. clustered before the leaves
Fruit samaroid

Trees or shrubs; Fl. in catkins of 1 or 2 kinds

Elæagnaceæ.
Shrubs; L. entire
Scaly, with a surface
Fl. diœcious, male in catkins

Salicaceæ (26).
Catkins of 2 kinds
Fl. diœcious
Seeds many, hairy

Myricaceæ.
Catkins of 2 kinds
L. dotted, aromatic
Fl. diœcious

Betulaceæ.
Catkins of 2 kinds
Fl. monœcious
Fruit 1-seeded
Ovary superior

Corylaceæ.
Catkin of 1 kind
Fl. monœcious
Pistillate flowers inferior, clustered or spiked
Fruit with a cupule

Empetraceæ (62).
Leaves heath-like
Sepals, petals, and stamens 3
Fruit baccate.

DICTYOGENÆ (3).

Leaves stalked.

Trilliaceæ (67).
Ovary superior
Parts in 4
Fl. solitary, hermaphrodite
L. whorled

Dioscoraceæ.
Twining plants
Fl. diœcious
Ovary inferior

Flowers irregular.

Polygalaceæ (40).
Leaves simple
Stam. 8, united
Anthers opening by pores
Sepals 5, 2 larger, petaloid

Fumariaceæ.
Leaves much divided
Stam. 6, diadelphous
Sep. 2, minute, deciduous

Balsaminaceæ.
Calyx spurred
Ovary 5-celled
Stamens 5

Flowers small, inconspicuous, usually green.

Aceraceæ.
Trees or shrubs
Fl. polygamous
L. opposite, radiate-veined
Stam. 8
Ovary 2-winged

Tamariscaceæ.
Shrubs
Leaves, scale-like, imbricate
Fl. pink, in spikes or racemes

Frankeniaceæ.
Heathlike plants
L. opposite
Style 3-cleft
Placenta free-central
Fl. sessile

Droseraceæ.
L. with circinate vernation and sticky hairs
Flowers white
Bog plants

Elatinaceæ (41).
Small aquatic plants
Leaves opposite
Stigma capitate
Sepals 3-4

Resedaceæ (42).
Stam. many, on a lateral disk
Ovary open at apex when full grown, 1-celled

Flowers inconspicuous in British Plants.

Herbs.

Portulacaceæ.
Sepals 2, united at base
Stam. opposite petals
Placenta free-central
L. opposite

Haloragaceæ (51).
Aquatic plants
L. dissected, whorled
Carpels 4, 1-seeded
Stam. 1 or 8

Shrubs.

Rhamnaceæ (48).
Shrubs; Fl. greenish
Æstivation valvate
Stamens opposite petals
L. pinnate veined

Celastraceæ.
Shrubs; Fl. greenish
Stam. alternate with petals
L. pinnate-veined
Æstivation imbricate

Ribesiaceæ (49).
Shrubs
Fl. racemose
L. radiate-veined
Placentas parietal

Paronychiaceæ.
(*See note 50 in Appendix.*)

Stamens hypogynous.

Ericaceæ (62).
L. simple, evergreen
Stam. 5, 8, 10
Anthers porous or partially slit, often appendaged

Monotropaceæ.
Leafless root parasites, with scaly pale stems
Stam. 8-10
Petals almost distinct

Ovary superior; corolla regular; stamens epipetalous.

Oleaceæ (58).
Trees or shrubs
L. opposite
Stamens 2
Cor. 4-lobed or none
Cor. valvate in bud

Aquifoliaceæ.
Trees; L. evergreen
Stigmas 4-5; Fl. axillary

Apocynaceæ.
L. opposite, entire
Corolla twisted
Stigma contracted like an hour glass
Stamens 5

Polemoniaceæ.
Stigmas 3; style 1
Petals contorted in bud

Cuscutaceæ.
Threadlike parasites, without without leaves
Cor. tube with scales

Plumbaginaceæ (60).
Stigmas 5; style 1
Stam. opposite petals
Ovary 1-seeded

Plantaginaceæ (61).
Leaves radical
Anthers versatile
Corolla membranous
Parts of flower in 4

Herbaceous; flowers inconspicuous, 1-seeded

Cannabinaceæ (65).
L. rough, radiate-veined, stipulate
Fl. diœcious
Fruit, a strobile

Urticaceæ.
L. hairy
Fl. small, greenish
Fruit 1-seeded

Chenopodiaceæ (66).
L. smooth or mealy
Fl. small
Ft. 1-seeded

Amaranthaceæ.
Similar to the last, but calyx and bracts membranous
Fl. unisexual

Santalaceæ.
L. entire, linear
Ovary inferior
Plac. free-central
Fl. perfect

Callitrichaceæ.
Aquatic plants
L. opp., entire
Fl. naked and unisexual
Ft. 4-seeded and 4-celled
Stam. 1

Ceratophyllaceæ.
Aquatic plants
L. whorled, dissected
Stam. 12-20
Fl. unisexual

Fl. irregular

Aristolochiaceæ.
Calyx irregular, often conspicuous and coloured
Parts 3-12
Anther on style or middle of filament

PETALOIDEÆ.

Fl. perfect.

Alismaceæ (71).
Aquatic or marsh plants
Carpels distinct
L. mostly radical

Juncaceæ (69).
L. grasslike
Perianth scarious
Fl. usually in heads

Acoraceæ.
L. sword-shaped
Fl. on a spadix, perfect

Flowers unisexual, on a spadix.

Terrestrial.

Araceæ (68).
L. stalked, net-veined
Fl. monœcious, on a spadix, within a spathe

Eriocaulaceæ.
L. grasslike
Fl. unisexual, in dense heads

Typhaceæ.
Fl. in dense spikes or globular heads
Perianth of hairs or scales
L. sword-shaped

Aquatic plants.

Naiadaceæ (70).
L. grasslike
Fl. in spathes
Pollen filamentous

Potamogetonaceæ.
Stems jointed, cellular
Stipules membranous
Carpels 4, distinct

Lemnaceæ.
Fronds simple or nearly so
Fl. monœcious

50.—**PARONYCHIACEÆ.**—By recent botanists this family is made a section of the Caryophyllaceæ, from which it chiefly differs in the presence of stipules. Scleranthus has no petals, and the capsule contains only one seed.

51.—**HALORAGACEÆ.**—In Hippuris vulgaris the leaves are simple and whorled, the calyx is scarcely visible, and the corolla is absent, and the single stamen and pistil of which each flower consists is axillary.

52.—**CAMPANULACEÆ.**—In Jasione montana the anthers are united at the base, thus approaching Lobeliaceæ, which, by some botanists, is made a section of Campanulaceæ.

53.—**VALERIANACEÆ.**—In Centranthus and Valeriana, the rim which represents the calyx unrolls, after the fall of the corolla, in the form of feathery pappus.

54.—**RUBIACEÆ.**—In Cinchonaceæ, which, by some botanists, is made a section of this family, the leaves are opposite, and the plants have interpetiolar stipules.

55.—**CAPRIFOLIACEÆ.**—The plants of this family are known from Cinchonaceæ by the absence of stipules. In Lonicera, the corolla is irregular.

56.—**OROBANCHACEÆ.**—This family differs from Scrophulariaceæ, chiefly in the absence of leaves, and in the parietal placentation. The only British plants having a similar appearance are Monotropa Hypopitys, which has 8 to 10 stamens and distinct petals, and the Bird's-nest Orchis (Listera Nidus-avis), which has a gynandrous stamen and six-parted perianth.

57.—**LENTIBULARIACEÆ.**—The plants of this family differ chiefly from those of Scrophulariaceæ in the free-central placentation. Pinguicula has flowers like those of Linaria, and pale leaves with inrolled margins, and grows in bogs. Utricularia has dissected leaves with small bladders, and a flower somewhat like that of Calceolaria.

58.—**OLEACEÆ.**—By some botanists, the Jasminaceæ, which are distinguished by having a five-to-eight parted corolla and imbricate æstivation, are separated from Oleaceæ. In

Fraxinus excelsior, neither calyx nor corolla are present, and sometimes even the two stamens are absent.

59.—**PRIMULACEÆ.**—In Glaux maritima the petals are absent; and in Samolus Valerandi there are five scales in the corolla tube, alternate with the petals, representing the row which is not developed in other plants of this family.

60.—**PLUMBAGINACEÆ.**—In Armeria the petals are almost distinct, and the flowers arranged in a capitulum. If due attention be paid to the five distinct hypogynous stamens and the five stigmas, this plant cannot be confounded with the Compositæ.

61.— **PLANTAGINACEÆ.** — In Littorella lacustris the flowers are monœcious.

62.—**ERICACEÆ.**—In Vaccinium the ovary is inferior, and the stamens are epigynous; on this account, it is sometimes placed in a distinct order which is then called Vacciniaceæ.

In Pyrola the petals are distinct or nearly so, and the leaves all radical. This genus is also, sometimes, placed in a separate family called Pyrolaceæ. Rhododendron has a minute calyx.

The Epacridaceæ, which are common in hothouses, look very like Ericaceæ, but have one-celled sessile anthers, which open longitudinally.

Empetrum nigrum (Empetraceæ) has heath-like leaves, but three-parted unisexual flowers, with scaly sepals and petals.

63.—**THYMELACEÆ.**—In Daphne Mezereum the tube of the calyx when fully developed separates into two layers, the inner being yellowish, and the outer pinkish, as if a corolla tube lined the tube of the calyx, and was united to it at the throat. The imbricate bracts in D. Mezereum must not be mistaken for a calyx.

64. — **CONIFERÆ.** — In Juniperus communis, the fruit, although called a berry, is a fleshy galbulus consisting of three united succulent bracts. Taxaceæ is sometimes made a section of this family.

65.—**CANNABINACEÆ** is sometimes included under Urticaceæ, from which it differs chiefly in the seeds having a spiral or hooked embryo.

66.—**CHENOPODIACEÆ.**—In Atriplex and Obione, the flowers are monœcious ; the other British plants of this family have hermaphrodite flowers.

67.—**TRILLIACÆ.**—The only British plant in this family is remarkable for having the parts of the flower in four, but the stem has an endogenous structure. The plants of this family are sometimes included under Smilaceæ, a family which differs chiefly from Dioscoraceæ in having a superior ovary.

68.—**ARACEÆ.**—The Araceæ, Acoraceæ, Typhaceæ, Naiadaceæ, Potamogetonacæ, and Lemnaceæ, are arranged by some botanists, together with the Palmaceæ, to form a group called Spadicifloræ.

Acoraceæ or Orontiaceæ is sometimes included under Araceæ. In Arum, the perianth is absent.

69.—**JUNCACEÆ.**—— This family differs chiefly from Liliaceæ in the small greenish perianth and grass-like leaves. In Narthecium Ossifragum the perianth is yellow, and the leaves are equitant.

70.—**NAIADACEÆ.**—In Naiadaceæ, Lemnaceæ, and two genera of Potamogetonaceæ, the perianth is absent.

71.—**ALISMACEÆ.**—In Butomus umbellatus, the seeds are attached to the whole of the inner surface of the carpels, and not to the edges only, as is the case in most plants.

FLORAL CALENDAR.

In the following list an asterisk against a name indicates that the plant diverges from the type of the family in some particulars. These plants will be found to be alluded to in the Appendix; the numbers following the names of the natural orders refer to the numbers in the Appendix. The generic name, when alone, indicates that several species are obtainable in blossom in the same month. Of garden flowers, the most familiar names are in many cases given, to facilitate the endeavour to obtain them; such names are printed in italics. The numbers preceding the names of the plants indicate the months in which the plants may be found in blossom.

MONTHS.

RANUNCULACEÆ (7).

1-2 Helleborus niger and H. purpurascens.
2 *Winter aconite* (Eranthis hyemalis).
3-4 Helleborus viridis and H. fœtidus, Anemone, Caltha, Ranunculus Ficaria and R. auricomus, Hepatica*, Trollius*.
5 Myosurus minimus*, Ranunculus bulbosus, Actæa spicata.*
6 Aconitum Napellus, Ranunculus acris, R. arvensis, R. aquatilis, Pæony, *Columbine* (Aquilegia), *Larkspur* (Delphinium), Nigella*.
7 Clematis*, Thalictrum, Ranunculus Flammula, Aconitum.
8 Ranunculus repens, R. flammula.
9-10 Anemone Japonica, *Winter Aconite.*
12 *Christmas Rose* (Helleborus niger).

PAPAVERACEÆ (8).

6-7 Chelidonium.
6-9 Papaver Rhœas, Glaucium luteum*.
7 Eschscholtzia*, Papaver somniferum.

BERBERIDACEÆ (38).

4 Jeffersonia diphylla.
5 Berberis*, Epimedium*.

MONTHS.

CRUCIFERÆ (10).

1-2 Iberis, Arabis.

1-12 *Shepherd's Purse* (Capsella Bursa-pastoris).

3 Draba verna.

3-6 *Wallflower.*

4-5 Cardamine, Alliaria officinalis, *Brompton Stock* (Matthiola), *Honesty* (Lunaria biennis).

6 Sinapis alba, Thlaspi arvense, Dentaria bulbifera*.

7 *Candytuft* (Iberis amara), Isatis*, Senebiera, Raphanus*, Diplotaxis *German Stock* (Matthiola).

FUMARIACEÆ.

2-6 Dielytra.

7-8 Fumaria.

VIOLACEÆ.

2-6 Viola odorata, V. hirta.

6 Viola sylvatica, V. tricolor.

POLYGALACEÆ (40).

6 Polygala vulgaris.

11-12 Polygala fruticosa.

CISTACEÆ.

6-7 Helianthemum, Cistus.

CARYOPHYLLACEÆ (11).

5 Stellaria Holostea, Cerastium.

6 Lychnis diurna*.

6-8 Stellaria graminea, Silene.

7 *Sweet William, Pink* (Dianthus).

8 Saponaria, *Corncockle* (Agrostemma Githago).

MALVACEÆ (9).

6 Malva.

6-9 Lavatera.

7-9 Althæa, Hibiscus.

12 Sida.

GERANIACEÆ.

1-12 *Scarlet Geranium.*

5-9 Geranium Robertianum.

6-7 Geranium pratense, G. sanguineum.

8-12 *Scarlet Geranium.*

RESEDACEÆ.

6-8 Reseda.

OXALIDACEÆ.

5 Oxalis Acetosella.

BALSAMINACEÆ.

6-7 Impatiens.

MONTHS.

LINACEÆ.

6 Linum catharticum.

6-7 Linum usitatissimum.

RHAMNACEÆ.

6 Rhamnus catharticus, R. Frangula.

LEGUMINOSÆ (13).

1-6 Ulex europæus.

2-3 Acacia longifolia*, Genista.

2-4 Acacia armata*.

5 Sarothamnus Scoparius, Vicia sepium, Laburnum.

6 Medicago maculata*, Astragalus glyciphyllos, Colutea arborescens, Vicia Cracca, Lathyrus Nissolia*, Lathyrus Aphaca*, Hippocrepis, Ornithopus, *Sweet Pea*, *Bean*, *Clover*,

7 Melilotus, Trifolium fragiferum*, Anthyllis, Lathyrus sylvestris, Orobus tuberosus*.

8-11 Ulex nanus.

12 Cassia corymbosa.

ROSACEÆ (12).

1-2 Pyrus Japonica, Kerria Japonica.

3 Potentilla Fragrariastrum, Amygdalus.

4 Prunus, Potentilla alba, Geum pyrenaicum, *Blackthorn*.

5 Pyrus, *Apple*, *Pear*, *Double Cherry*,* *Whitethorn*, *Quince*, *Strawberry*.

6 Agrimonia, Alchemilla*, Poterium*, Rosa.

7 Spiræa, Sanguisorba*, Potentilla anserina, P. Tormentilla, Rubus.

ONAGRACEÆ.

6-11 Fuchsia, Circæa, Epilobium angustifolium.

7 Clarkia, Epilobium hirsutum, Œnothera.

CUCURBITACEÆ.

7 Bryonia alba, Ecballium, *Cucumber*, *Vegetable Marrow*.

SAXIFRAGACEÆ (44).

2-4 Saxifraga crassifolia.

5 Saxifraga granulata*, S. tridactylites, Chrysosplenium.

6 Saxifraga umbrosa.

CRASSULACEÆ.

2 Echeveria.

7 Sedum acre, S. album, S. reflexum.

GROSSULARIACEÆ.

5 Ribes sanguinea, *Currant*, *Gooseberry*.

UMBELLIFERÆ (14).

4-5 Anthriscus sylvestris, Myrrhis, *Caraway*, Smyrnium.

6 Astrantia, Ægopodium, Coriandrum, Daucus.

7 Sanicula*, Eryngium*, Hydrocotyle*, Œnanthe, Æthusa, Fœniculum Archangelica, Conium, Scandix*, Bupleurum.

MONTHS.

CAPRIFOLIACEÆ.

5 Viburnum Lantana.

6 Diervilla amabilis, *Guelder Rose**, *Honeysuckle*, *Elder.*

12-3 *Laurustinus.*

RUBIACEÆ.

4-6 Galium cruciat~~um~~a, G. Aparine.

7-8 Galium Mollugo, G. verum, Rubia peregrina, R. tinctorum.

CINCHONACEÆ.

3 Rondeletia.

11 Ixora.

12 Bouvardia.

VALERIANACEÆ (53).

5 Valeriana dioica, Valerianella.

6-7 Valeriana officinalis, Centranthus.

DIPSACACEÆ.

7 Knautia arvensis, Scabiosa.

8 Dipsacus.

9 Scabiosa succisa.

COMPOSITÆ.

1-2 Senecio vulgaris, Petasites fragrans, Cineraria.

3-4 Tussilago Farfara, Petasites vulgaris.

5 Doronicum, *Chicory.*

6 Centaurea nigra, C. Cyanus, Apargia, Tragopogon, *Dandelion.*

12 Calendula, Matricaria Chamomilla, Carduus nutans, Hieracium Pilosella.

7 Inula Helenium, Conyza squarrosa, Anthemis Cotula, A. nobilis, Achillea, Centaurea Scabiosa, *Moon Daisy*, *Feverfew*, *Wormwood*, *Cudweed.*

9 Lactuca virosa, Sonchus.

8-9 Sunflower, Hieracium, Bidens, Serratula, Arctium, *Tansy.*

12 Petasites fragrans.

LOBELIACEÆ.

7 Lobelia.

CAMPANULACEÆ (15).

7 Campanula rotundifolia, C. Trachelium, Jasione montana*.

ERICACEÆ (62).

1-2 Erica, Azalea. Arbuthus Unedo

3-4 Rhododendron.

5 Vaccinium Myrtillus.

6 Kalmia, Arbutus.

7 Calluna, Erica Tetralix, Monotropa*.

9 Arbutus Unedo.

MONTHS.

OLEACEÆ (58).

1-2 Jasminum nudiflorum.
3 Forsythia.
4 *Ash**.
5 *Lilac.*
6 *Privet.*
7 *Jasmine.*

GENTIANACEÆ (21).

3-4 Gentiana acaulis.
5 Menyanthes*.
6 Chlora.
7 Erythræa,* Gentiana.

POLEMONIACEÆ.

6 Cobæa.
7 Polemonium.
8 *Phlox.*

CONVOLVULACEÆ.

6 Convolvulus arvensis, Calystegia sepium, Cuscuta, (Cuscutaceæ).
7. Convolvulus minor, C. major.

BORAGINACEÆ (18).

2-3 Pulmonaria.
4 Anchusa sempervirens.
5 Myosotis, Comfrey.
6-7 Echium vulgare, Lycopsis, Hound's Tongue, Lithospermum.

SOLANACEÆ (19).

1-2 Mandragora vernalis, *Tobacco*, *Capsicum.*
9-12 Winter Cherry.
6-7 Lycium, Hyoscyamus, *Belladonna*, *Stramonium*, *Dulcamara*, *Potato.*
10 Solanum jasminoides.

SCROPHULARIACEÆ (16).

5 Linaria Cymbalaria, Veronica.
6 Antirrhinum, Linaria vulgaris, Calceolaria, Digitalis, Scrophularia, Rhinanthus, Pedicularis, Mimulus.

LABIATÆ (17).

1-3 Lamium album and L. purpureum, Nepeta Glechoma, *Rosemary.**
4 *Bugle*, *Weasel Snout.*
6 Salvia, Thymus.
7 Lycopus,* Salvia, Prunella, *Betonica*, *Peppermint*, *Woodsage.*
8 Origanum, *Pennyroyal*, Marrubium, Mentha.

PRIMULACEÆ (59).

1-2 Primula Sinensis, Cyclamen.
3-4 Primula vulgaris.
5 Polyanthus, Primula Japonica*.
6 Lysimachia, Anagallis arvensis.
7 Samolus*.
8 Cyclamen.

MONTHS.

POLYGONACEÆ.

5 *Bistort*, *Sheepsorrel*, *Knotgrass.*
6 Rumex crispus, R. acetosa, Polygonum Persicaria, *Rhubarb.*
7 *Buckwheat.*

THYMELACEÆ.

3 Mezereon, Spurge Laurel.
6 Daphne Cneorum.

ARISTOLOCHIACÆ.

3-5 Asarum Europæum*.
6 Aristolochia Clematitis.

VERBENACEÆ.

6-9 Verbena.

EUPHORBIACEÆ (24)

12-1 Poinsettia, Euphorbia jacquinæflora, E. splendens.
3-4 Euphorbia amygdaloides, Mercurialis perennis*.
5 Buxus*, Euphorbia Lathyris.
6-7 Mercurialis annua*, Euphorbia helioscopia.
8-9 Ricinus.

URTICACEÆ.

5 Dorstenia, *Fig.*
6 Urtica, Parietaria, *Mulberry.*
7 *Hop*, *Hemp.*

ULMACEÆ.

3 Ulmus.

AMENTIFERÆ.

1-3 *Hazel.*
3 Populus nigra, *Alder.*
4 Populus canescens, *Oak.*
5 Salix caprea, S. viminalis, Myrica Gale, *Birch*, *Chestnut*, *Hornbeam.*

CONIFERÆ (64).

3 *Yew.*
5 *Júniper**, *Scotch Fir.*

TRILLIACEÆ.

4 Paris quadrifolia.

DIOSCORACEÆ.

6 Tamus communis.

ORCHIDACEÆ (26).

1-2 Dendrobium nobile.
5 Orchis maculata, Cypripedium.
6 Orchis Morio, Cephalanthera, *Bee orchis*, *Birds'-nest orchis.*
7 Epipactis.
8-9 Spiranthes autumnalis.

MONTHS.

LILIACEÆ (28).

1-2 *Tulip, Hyacinth, Lily of the Valley.*
3 Ruscus aculeatus.
4 Muscari, Tritelia uniflora, *Crown Imperial, Bluebell.*
5 Convallaria, Polygonatum, Tiger Lily, Fritillaria meleagris, Ornithogalum, Allium ursinum.
6 Funkia.
8 Scilla autumnalis.
9-10 Uvaria tritoma.

MELANTHACEÆ.

4 Uvularia puberula*.
5 Bulbocodium vernum.
7 Veratrum nigrum.
8-9 Colchicum autumnale.

JUNCACEÆ (69).

4 Luzula campestris.
5 Luzula pilosa, L. sylvatica.
7 Narthecium*, Juncus.

ARACEÆ.

5 Arum maculatum.

ACORACEÆ.

6 Acorus Calamus.
2-12 Pontederia.

ALISMACEÆ (71).

7 Alisma Plantago, Butomus umbellatus*.

AMARYLLIDACEÆ.

1-6 Narcissus.
1-2 Eucharis, *Snowdrop**.
3 *Daffodil.*
6 Pancratium*.
9-12 Eucharis*.

IRIDACEÆ (27).

2-3 *Crocus*, Iris reticulata.
6 Iris Pseudacorus, &c.
7 Iris fœtidissima, Gladiolus.

CYPERACEÆ (31).

5 Carex pendula, C. vesicaria, C. paludosa, Eriophorum.
6 Eleocharis, Scirpus lacustris.

GRAMINACEÆ.

6 Melica, Briza, Bromus erectus, Lolium.
7 Phalaris canariensis, Avena, Triticum repens.

A LIST FOR USE IN MEDICAL SCHOOLS.

[This list is intended to show the families which can be most conveniently studied during each month of the summer session for botany.]

MAY.

THALAMIFLORÆ.
Berberidaceæ.
Fumariaceæ.
CALYCIFLORÆ.
Rosaceæ.
Saxifragaceæ.
COROLLIFLORÆ.
Oleaceæ.
Primulaceæ.
Boraginaceæ.

MONOCHLAMYDEÆ.
Amentiferæ.

DICTYOGENÆ.
Trilliaceæ.
Araceæ.

PETALOIDEÆ.
Juncaceæ.
Liliaceæ.
Melanthaceæ.
Orchidaceæ.
Iridaceæ.
Amaryllidaceæ.

JUNE.

THALAMIFLORÆ.
Ranunculaceæ.
Cruciferæ.
Polygalaceæ.
CALYCIFLORÆ.
Leguminosæ.
Rhamnaceæ.
COROLLIFLORÆ.
Caprifoliaceæ.
Labiatæ.
Verbenaceæ.
Scrophulariaceæ.
Solanaceæ.
Compositæ.
Valerianaceæ.

MONOCHLAMYDEÆ.
Polygonaceæ.
Urticaceæ.
DICTYOGENÆ.
Dioscoraceæ.
GLUMIFERÆ.
Graminaceæ.
Cyperaceæ.

JULY.

THALAMIFLORÆ.
Papaveraceæ.
Malvaceæ.
Hypericaceæ.
Linaceæ.
Geraniaceæ.
Violaceæ.
Resedaceæ.
CALYCIFLORÆ.
Umbelliferæ.
Onagraceæ.
Cucurbitaceæ.
Lythraceæ.
Crassulaceæ.

COROLLIFLORÆ.
Rubiaceæ.
Gentianaceæ.
Lobeliaceæ.
Campanulaceæ.
Polemoniaceæ.
Convolvulaceæ.
PETALOIDEÆ.
Alismaceæ.

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Fellow and Censor (Examiner in Materia Medica) King and Queen's College, Physicians, Ireland; Lecturer on Materia Medica in the Carmichael School of Medicine, Dublin; Physician to the Mercers' Hospital, &c.

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